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The Outlook

Over the Atlantic

AMERICAN Export Airlines was recently granted a "certificate of convenience and necessity" by the Civil Aeronautics Board for the operation of a service across the Atlantic in addition to that already being run by Pan American Airways. The certificate was granted after the application by American Export had been examined by the Navy and State Departments, the Post Office and the Civil Aeronautics Board. Now the appropriations committee of the House of Representatives has voted against the provision of funds to pay for the service, so in effect reversing the decision of four Government Departments and rendering valueless a certificate carrying the signature of the President. Our contemporary, *American Aviation*, takes the view that Congress might as well abolish such examining agencies if it is not going to accept their decisions, arrived at after careful investigation.

While we on this side of the Atlantic are not directly interested in such matters, and must therefore be cautious and diffident about expressing our opinions, we cannot help thinking that this view is correct. And we are, too, indirectly affected by such decisions, for Atlantic communications are of vital importance to us. Lack of aircraft prevents us from running all-the-year-round services across the Atlantic, but we must have them for the transport of our national representatives to deal with war matters in the United States. So the more American services there are the better. And there appears to be little doubt about the ability of American Export to run an airline efficiently, for they have done considerable investigation work for years past and have on order some efficient Vought-Sikorsky flying boats as a fleet. We hope that this will not be the end of the matter, and that American Export Airlines will be given their chance to run a service instead of leaving the Atlantic crossing as the monopoly of Pan American. We hope, too, that the British service about which our Air Minister, Sir Archibald Sinclair, spoke recently, will soon start.

"All Burnt Up"

MR. MAX KARANT, managing editor of the American journal, *Flying and Popular Aviation*, is reported as expressing surprise that full details of the newest and most secret American military aircraft have been published recently in semi-official English aeronautical journals. "It burns me and all other American aviation writers and editors to find that the British not only have all our secrets but also print them openly when the information is suppressed here at home," he said.

When we read this in *American Aviation* we wondered several things. We wondered, first, what a semi-official English aeronautical journal was, for all those we know have no connection with the Government. Then we wondered which of the English journals had so offended, for we certainly regard the publication of secret American information as an offence. But we have not seen anything published here which has not been released in U.S.A. Also we wondered at Mr. Karant being spokesman for all other American aviation writers and editors.

But what perplexed us most of all was just how Mr. Karant's own paper came to publish in its December issue an article giving performance and engine information on such new British types as the Tornado, Whirlwind and Manchester, whose names even could not then be mentioned in this country. This article was written by Mr. Leonard Engel, who had just previously been resident in England and who knew this information was secret and could not be released here, so he wrote his article after his return to America, and *Flying and Popular Aviation* published it. Now Mr. Karant is all burnt up.

Assisted Landings

MANY are the discussions which have taken place concerning the merits of the different systems of assisted take-off proposed and/or tried out from time to time. Catapult, Composite and Slip-wing have had their respective cases argued. The case for assisted landings has not so far been put forward, unless one regards the tricycle undercarriage in that light.

In the ordinary way there is, of course, small need for assisting landings by means external to the aircraft, but at least one aspect of the war has developed along lines which appear to make some form of assisted landings desirable. We refer to what has been called the Battle of the Atlantic.

Flying boats and landplanes are doing good work in patrolling the western approaches, but they cannot cover the entire distance. What, it seems to us, is wanted is a strong air escort constantly circling around and ahead of every convoy, and that can only be achieved by some means which will enable aircraft to refuel from some vessel in the convoy itself.

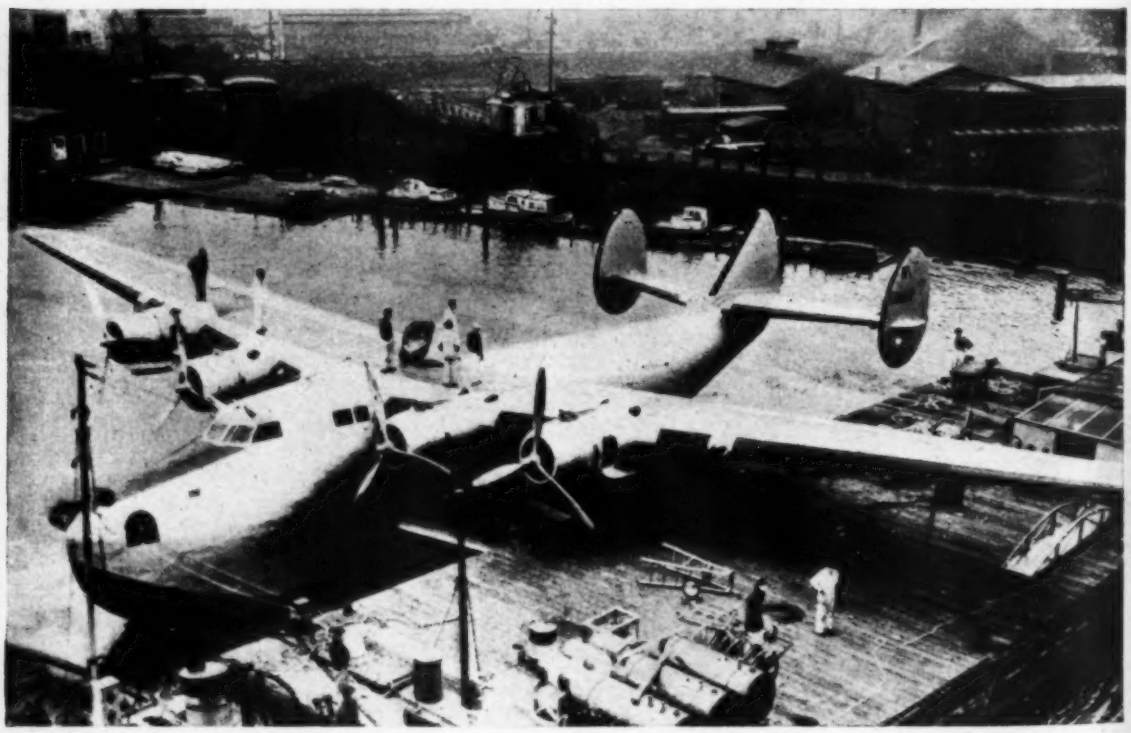
Catapult launching of aircraft has been used in the Royal Navy for very many years. Usually the aircraft have been seaplanes, the theory being that after their flight they can alight on the sea near the parent vessel and be picked up by her.

In this connection it would be well not to overlook the experience of the German Lufthansa before the war, when mother ships stationed at sea took on board Dornier flying boats, refuelled them, and catapulted them off again. These ships made use of "aprons" trailed in the water aft of the vessel. The flying boats alighted close to the free end of the apron, taxied on to the apron and were lifted on board for the refuelling. The advantage of the apron was that it reduced to a few minutes the time which the flying boat had to spend on the open sea, and the actual refuelling was carried out in comfort on board.

Air Power versus Tank Power

BOTH in Greece and in Libya the R.A.F. appears to hold the upper hand in the air, while the indications are that in both theatres the enemy has a superiority in mechanised forces. The strength of the German army lies in its development of Panzer divisions, supported in previous campaigns by dive-bombers. In the campaigns in Poland and France these particular aircraft met with no adequate opposition, and the combination of motor vehicles on the ground and motor-driven craft in the air proved irresistible. In the campaigns now in progress the enemy is very stoutly opposed in the air, and if he still has numbers on his side, that is the limit of his advantage. The Battle of Britain has shown that numbers of aircraft do not overcome superior quality.

The weakest point about a Panzer division is the difficulty of supply. In the parts of Europe where the Germans have hitherto fought that difficulty could be, and was, overcome. The problem is far less tractable in the mountains of the Balkans and the sands of Libya. In the latter it has been reported that the Germans have been using aircraft to bring up the fuel and other supplies for their tanks and armoured cars. They can surely not count on such methods to any great extent. In the Balkans, too, the paucity of roads and the activity of the R.A.F. Blenheims ought to make the supplying of the rapid Panzer divisions extremely difficult. Will air power or tank power win? Much depends on the answer to that question.



WINGED CLIPPER. The first of the six new-type Boeing Clippers (which we showed as a "clipped Clipper" moving wingless out of the factory in the March 13th issue) has now been launched and is here seen being taken sideways down the Duwamish River from Seattle to Puget Sound for flight testing. Pan American announce that they expect to increase their present three return Atlantic trips per week to four in May, when the first new boat goes into service. Later, six trips per week will be run. Three of the six new Clippers will be made available to Britain. (Also see page 302 for news of the reconditioned Clippers.)

War in the Air

The Balkans Battle : Importance of Tobruk : Berlin and London Heavily Raided : Success of Night Fighters

INTEREST continues to centre on the land battle in the Balkans, in which all the air forces are playing an auxiliary but highly important part. The German intervention has naturally brought about new alignments for all the Allied forces in that theatre of the war. The Army of the Nile has withdrawn from most of Cyrenaica, though holding on to Tobruk, and has allowed the enemy to occupy Bardia and to demonstrate against Sollum. In Albania the Greeks have withdrawn from Koritza and extended their line over the Pindus Mountains to join up with the British line which reaches the Aegean Sea at Mount Olympus, the home, so the ancient Hellenes believed, of Zeus and Hera and all the other gods. The Germans seem to have joined hands with the Italian forces in Albania. What has happened to the Yugoslav armies is not clear, but it seems at the moment that they have been reduced to scattered bands of guerillas, which can none the less make a great nuisance of themselves to invaders in mountainous country. Only in East Africa does everything continue to go victoriously for the Empire forces—and, of course, on the blue waters of the Mediterranean.

It was somewhat of a surprise that the first rush of the Germans should have carried them successfully through the mountain passes down to Salonika without any serious interference from the R.A.F. But now that the front has grown more stable our bombers and fighters are exceedingly active in attacking the German communications and lines of convoys, and they have had great success. The Me 109s seem quite unable to give protection to the motor convoys, or to hold off the R.A.F. night bombers from the railway station in Sofia. The roads through the Balkan mountains are not so numerous as those through the Low Countries and Northern France, and in those mountains determined bombers ought to have a great effect in hampering the delivery of supplies of the fighting lines. In such conditions bombers ought to be seen at their best, and the results of their work should be most immediate and most telling. From the reports it appears that, although the Germans have joined the Italians and are much more determined fighters, the R.A.F. still have the mastery in the air in Greece, and actually still rule it in North Africa.

CHEATING DAVY JONES: The crew of an R.A.F. bomber on the deck of the destroyer which rescued them after 24 hours afloat in a rubber dinghy

WILLY NILLY: Generalfeldmarshal Goering and Willy Messerschmitt, the aircraft designer, in a press photographers' conference.

Hitting Enemy Supplies

IT can also be said that bombing is a more satisfactory business when a land campaign is in progress. When all is quiet on land, the Bomber Command may attack German production night after night, but its efforts cannot hold up anything like 50 per cent. of that production, and so the German reserves of material grew during the winter months, and the German Army used up no part of them. When that army is invading another country and meeting with strong resistance, it uses up heaps of material every day, and supplies of spares are an urgent necessity. If the bombers can interfere seriously with those supplies they are doing most valuable service to their side.

One of the most cheering items of news lately told how the R.A.F. got on to a motor supply column in Libya and destroyed some hundred vehicles. A hundred motor vehicles take a lot of replacing when their owners do not command the seas between the advanced base (i.e., Tripoli) and the country of origin. The Italians had laid in large stores of all sorts of material in Libya before the outbreak of the war, but they lost a lot during Sir Maitland Wilson's successive hauls at Sidi Barrani, Bardia, Tobruk and Benghazi. The Germans must have got a quite surprising amount of stuff across while the British Fleet was preoccupied with watching for the Italian battle fleet. Our submarines took a certain toll of the supply ships, but still a lot got through. Now that the Italian Navy has practically ceased to exist, British warships can spread their energies more widely, and they caught one large enemy convoy and destroyed every ship in it, including its escort of Italian destroyers, for the loss of one British Tribal class destroyer, H.M.S. *Mohawk*. The loss of that convoy must have been a serious blow for the Germans and Italians in Tripoli.

The German mechanised forces made a dash past Tobruk to Bardia

WAR IN THE AIR (Continued)

and on to Sollum; but provided that Tobruk is adequately garrisoned, as is believed to be the case, the enemy cannot attempt a serious invasion of Egypt with that hostile post on the flank of their advance, especially as that post has sea communications. They tried one surprise attack on the place and were rebuffed.

The affair was not much more than a reconnaissance in force, or a major skirmish, for the enemy only lost 100 men or so killed and twice that number taken prisoner. They lost 15 tanks and we lost eight. It will be much easier for us to make good the loss than it will be for them. Along the few roads in the desert the R.A.F. bombers are constantly vigilant and aggressive, and night raids on the harbour of Tripoli itself are frequent. The Egyptian Government does not seem to be in the least alarmed at the renewed chance of the enemy invading that country.

One of the least desirable jobs in this war must be that of pilot (or, for that matter, gunner) of a Ju 87 dive-bomber. Such men had their moments in Poland and in the Battle of France, but since then the *Luftwaffe* chiefs seem to have regarded that type of aircraft as (in the words of a certain R.A.F. officer) "expendible stores." The Stukas are regularly sent out like sheep to the slaughter (their considerable success in the affair of the Sicilian Straits was very costly to the crews), and the Hurricanes of the Middle East find in them an easy way of swelling their total of enemy machines certainly destroyed. Great numbers of Ju 87s have been sent to the Balkans front, where they would perform their natural work of co-operating with the German Army, but they have not found their work there at all safe or easy. Some Ju 88s, have also been used there for dive-bombing and have also suffered casualties. The latter are much more valuable machines, and the Germans are loath to risk many of them on work which can be done by the less valuable 87. Apart from the enemy aircraft shot down in the air in the Middle East, the R.A.F. have continued to destroy large numbers on the ground. When our forces entered Addis Ababa they found 31 wrecks in hangars, and recently the R.A.F. destroyed 17 on the ground at Derna Unless the enemy can attain something like parity in the air in Libya, they certainly will not be able to take full advantage of the British withdrawals. Air parity, if not supremacy, is desirable in all campaigns, but particularly so in desert warfare where roads are few and are easily watched and bombed.

Night and Day Bombing

WITH the spring weather the daffodils come out and so do the bombers. The farmers pray for fine weather to bring on their crops and seeds: the townsman laments the foggy nights when aeroplanes are kept aground. The night bomber crews revel in the opportunities for destruction, and the night fighters welcome the moonlight and the abundance of targets.

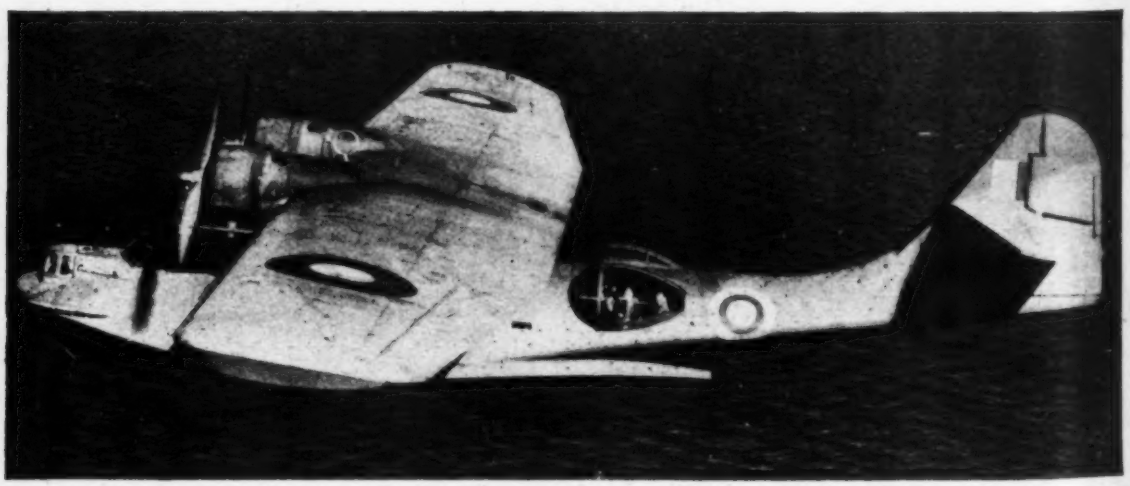
Naturally the greatest prize for the bombers on either side has been the presence of the German warships *Scharnhorst* and *Gneisenau* in Brest Harbour. The Bomber Command has used every endeavour to plant heavy bombs on one or both of them, and the crews have claimed any number of near misses. Some of these may have been hits, for the results could not always be clearly observed. Near misses may well do damage, and it is quite possible that damage has been done. But, up to the moment of writing, those ships have not been sunk, and we have no certain knowledge that they are any the worse for the energies which the Bomber Command has expended. We all continue to hope that their capacity for raiding shipping in the Atlantic has been curtailed.

Kiel has also been subjected to a series of very heavy night raids, and much of the town has been reduced to ashes. Many buildings of importance to the work of the naval dockyard have been hit, and again we must hope that the building of submarines has been seriously hampered. There have also been numerous severe attacks on the aerodrome of Merignac, near Bordeaux, where the Focke-Wulf Kuriers are based. All this has been sound military use of bomber aircraft.

On one night the heavy bombers penetrated once more to Berlin and do not seem to have confined their attentions to railways and factories. They created considerable havoc in and round the Unter den Linden, and burnt the great Opera House and various other buildings. The loss of German life is believed to have been considerable. The Germans called it an attack on the cultural life of their Capital—though the real culture of Germany has suffered more from the policy of Adolf Hitler and the Nazi party than it can ever suffer from British bombs.

Big Raid on London

THE Germans were prompt to take revenge. They sent pretty nearly every bomber they could raise against London one night, and showered down H.E. and incendiary bombs in vast numbers. The raid started at 9 p.m., and the "all clear" did not go until 5 a.m. next morning. There rarely seemed any interval in the procession of bombers overhead, and the gunfire only ceased when the British night fighters were in action. Naturally the



CONVOY PROTECTORS: An air view of one of the long-range Consolidated Catalina flying boats now being used by Coastal Command in the Battle of the Atlantic.

WAR IN THE AIR (Continued)

A BLISTER FOR A POULTICE : The Consolidated Catalina flying boats have twin Vickers K guns mounted in the midship blister turrets.

damage was great, for though most of the fire bombs were extinguished a number got hold of buildings. It was the heaviest raid by either side so far during the war. The Germans seemed to take no particular aim, but dropped their bombs anywhere in the London area. The next night the R.A.F. went for Berlin again. The *Luftwaffe* retorted on London. Once reprisals start there is no reason why they should come to an end. They are likely to go up in a crescendo, for neither side buys immunity for its own cities by such a policy.

Another recent innovation by the *Luftwaffe* was a raid on Northern Ireland, where bombs were dropped over most districts of the six counties, but mostly on Belfast.

During the period of the moon the R.A.F. night fighters and the A.A. gunners had more success than has before rewarded their efforts. The Beaufighter proved particularly effective, but Defiants and Hurricanes also had useful scores. In the first 20 days of April, 71 German night bombers were shot down, 50 of them by fighters. From the beginning of the year up to the same date the total destroyed was 146.

A Sea Shanty

SHIPS at sea, sometimes flying the White Ensign and sometimes the proud "Red Duster," have done more than was expected of them in shooting down enemy aircraft which have attacked them, but the case of the *Jamaica Producer* must be very nearly unique. One evening in March those upon the bridge of the British merchant ship *Jamaica Producer* saw an enemy aircraft flying straight towards their ship in a long, low glide. Then, at a distance of about 400 yards, the German pilot opened his throttle, but those on the bridge of the steamer considered that he could not possibly clear the masthead height of their ship. The helm of the *Jamaica Producer* was at once put hard over with the intention of fouling the enemy aircraft with the foremast, or at least upsetting his plan of attack. As soon as the ship began to swing the Heinkel opened fire with his forward machine-guns at very close range and, at the same time, began to climb steeply. The enemy's fire was returned by the *Jamaica Producer*, the chief officer manning the gun in face of the enemy's close-range fire. Seeing that he might not clear, the German pilot attempted to swerve to port. In doing so he fouled the fore topmast with his tail. A terrific jolt was felt on the deck of the ship as the tail struck the upper crow's-nest. The wireless aerial and fore topmast backstay came crashing down on the deck and these were followed by great pieces of the aircraft which fell all over the ship and into the sea around. Those on the bridge saw the Heinkel sideslip round the stern in a very unstable manner. A rating who was aft at the time saw the aircraft, without a tail, come close over his head, and a moment later a huge column of water spouted up as the Heinkel crashed into the sea.

During the whole of this extraordinary incident the passengers on board continued to play bridge.

ENEMY AIR LOSSES TO APRIL 19th

		Over G.B.	Over Europe	Middle East
April	6	—	—	26
"	7	8	—	—
"	8	11	—	—
"	9	14	1	—
"	10	3	—	22
"	11	16	1	22
"	12	—	1	—
"	13	2	—	5
"	14	—	—	31
"	15	10	2	13
"	16	6	1	2
"	17	5	2	1
"	18	—	—	9
"	19	2	—	14
		77	8	145

Total in Northern Area : 4,431. Total in Middle East about 1,393.

The Modern Thermopylae

LATER news from the great struggle in the North of Greece tells that the British and Greeks are still falling back, and outside experts hold that a shorter line is necessary, considering the paucity of the Allied forces opposed to the great German drive. The British, or, rather, the Empire forces (though most of them are of British stock and proud of it) have evacuated the area of Mount Olympus.

The Germans have amassed great numbers of Junkers and Me 109s to help their ground troops, more than had been expected, and they have been harassing the Allied supply convoys. The Hurricanes are doing wonders and shooting down large numbers with small loss to themselves, but there are not enough Allied fighters to deal with all the swarms opposed to them. The Blenheims are hitting back on the German troop movements and supply columns, and prisoners have told of how the invading soldiers hate their attentions. But numbers are what our side wants.

A Warning

THE British Government has announced that its bombing attacks on Berlin (in which Stirling machines took part) were not reprisals, but part of the national policy of hitting the enemy where our blows do most towards winning the war. Towards Rome the Government has adopted a different policy, having issued a warning that if the enemy bombs Athens or Cairo the R.A.F. will strike back at Rome and will continue to do so while the war lasts. It also exposed an Italian plan for dropping captured British bombs on the Vatican City in order to discredit the British. The strictest orders have been issued to the R.A.F. that in no circumstances is the Vatican City to be damaged.

BRITISH AIR LOSSES TO APRIL 19th

		Over G.B.		Over Europe and the Sea		Middle East
		Aircraft	Pilots	Aircraft		Aircraft
April	6	—	—	4		—
"	7	—	—	5		—
"	8	—	—	—		—
"	9	—	—	9		—
"	10	1	1	8		2
"	11	—	—	2		10
"	12	—	—	4		—
"	13	—	—	1		7
"	14	—	—	1		4
"	15	—	—	5		2
"	16	—	—	5		4
"	17	—	—	8		—
"	18	—	—	8		1
"	19	—	—	1		1
		1	1	61		31

Total over Northern Area, 1,876. Middle East total not available, but about 164.

HERE AND THERE

American Visitors

AMONG the distinguished Americans who have arrived in this country recently the British aviation world is particularly glad to welcome Maj. Gen. Henry H. Arnold and Dr. Edward P. Warner. Maj. Gen. Arnold, Chief of the U.S. Army Air Corps, is one of the pioneers of American aviation, and he is over here as an official observer, to lend his aid in speeding-up arms deliveries by learning at first hand our needs and requirements.

Dr. Edward P. Warner may be said to represent the technical side, of which he has had many years' experience. Like Maj. Gen. Arnold, he is a member of the American National Advisory Committee for Aeronautics, and therefore *au fait* with the latest American technical and aerodynamic developments.

Aircraft Manufacture

THE May issue of *Aircraft Production*, published to-day, reviews aircraft progress in Britain and in America. The main articles describe features of the four-engined "Liberator" bomber and the manufacture of the Lodge aircraft plug. Plywood for aircraft is the subject of another article dealing with the preparation of veneers and the manufacturing processes employed by Flexo Plywood Industries, Ltd. There is also a description of the drop-testing of landing gear manufactured by Rubery Owen Messier, Ltd., whilst foundry engineers will find an article on the subject of the die casting of aircraft parts of particular interest. *Aircraft Production* is the monthly technical journal of the aircraft manufacturing industry and is priced at 1s. 6d.

Fortresses Fly the Atlantic

BOEING B 17C Flying Fortresses are now crossing the Atlantic and will be very useful machines to add to our bombing fleets. Though smaller than the Short Sterling, they are of considerable size with their span of 103ft. 10in. and total loaded weight of 47,450 lb. Claims that they have a maximum speed of over 300 m.p.h. are not likely to be realised, but it is stated that they have broken the speed record for the crossing. This means that they must be getting across in about seven hours.

One Man Two Jobs!

AS a result of some expressed anxiety that the A.T.C. is attracting large numbers of young men who would otherwise have joined the Home Guard and that many are actually resigning from the latter body to join the A.T.C., the War Office has been moved to voice the opinion that there is no objection to young men serving with both organisations on the understanding that in the event of "active operations" the Home Guard would have first call on them.

Nevertheless, one practical objection certainly seems to suggest itself, namely, that the young man in both organisations may well find his Home Guard duty periods often clashing with his A.T.C. evening classes, with the risk of his becoming really efficient in neither sphere. In our opinion, therefore, it would be far more in the national interest for such young men to make a definite choice and concentrate on either one or the other.

Major General H. H. Arnold, Chief of the U.S. Army Air Corps, arrived in England recently.

First Australian Beaufort

THE completion of the first Australian-built Beaufort has been announced in Melbourne.

This is welcome news and it is hoped that more Beauforts will swiftly follow the first one, for this twin-engined general purpose torpedo-carrier will be very useful in the defence of Australia. Any attack on that country would have to be sea-borne and flocks of torpedo-carriers could make the reception given to any hostile fleet a very hot one. The first Beaufort cannot be powered by Australian-built engines as the factory for the manufacture of the Pratt and Whitney Twin Wasp has just been completed, but is not yet in production. The Beaufort is being made by the Aircraft Production Commission, a Government organisation set up with the Railway Workshops as its nucleus. It is not a production of the Commonwealth Aircraft Corporation, which is a private company making the Wirraway and soon, it is expected, a later type of their own design.

Fighter Spare-parts List

AS a result of the world-wide popularity (outside Axis countries) of Spitfire funds, most people now know that a single-seater fighter costs something in the region of £5,000. At any rate, that is the round sum which is now generally accepted, for fund collecting purposes, as representing the purchase price of a Spitfire or similar aircraft.

The Motor Industry Fighter Fund, however, has evolved a sort of "spare-parts list," which gives a very interesting insight into the relative costs of the various bits and pieces that assemble into a fighter plane. *Flight* does not vouch for the strict accuracy of the details, which are no doubt only meant to be approximate, but they are given here as a matter of more than passing interest if only because the subscriber to a fighter-fund will in future know how much of the aircraft he has paid for, which may be anything from a rivet to a Rolls-Royce engine.

Rolls-Royce engine, £2,000; eight guns (each), £100; fuselage, £2,500; wing, £1,800; aircrew, £350; tail, £500; cockpit cover, £15; undercarriage, £800; compass, £5; radio, £50; petrol tank, £40; oil tank, £25; elevator, £5; windscreen, £10; blast tube for gun, 15s.; rivet, 6d.

Strange Sight in New England

"PLYWOOD BOTTLENECK SEEN," *American Aviation* heads a paragraph in a recent issue. Good, we always thought glass was such dangerous stuff. What an age of progress we live in . . . But no, it merely seems that the New England section of the Society of American Foresters was being warned that the lumber industry was insufficiently prepared to meet the increasing demands for plywood which the aircraft factories would soon be making. And we had visions of beer in the wood. Ah me, this modern English!

Five Million Air Miles

FIGURES for last year's operations by the Trans-Canadian Air Lines recently published show a total of 5,000,000 aircraft miles successfully flown. This is nearly double the previous year's total. During the year approximately 55,000 passengers, 100,000 lb. of freight and 1,000,000 lb. of mail were carried.

The service operates between Moncton (New Brunswick) and Vancouver, with a branch line to Seattle. This route formed the main North American link in the projected all-Empire chain of air services round the world which was being planned before the war.

Ploughshare Into Sword

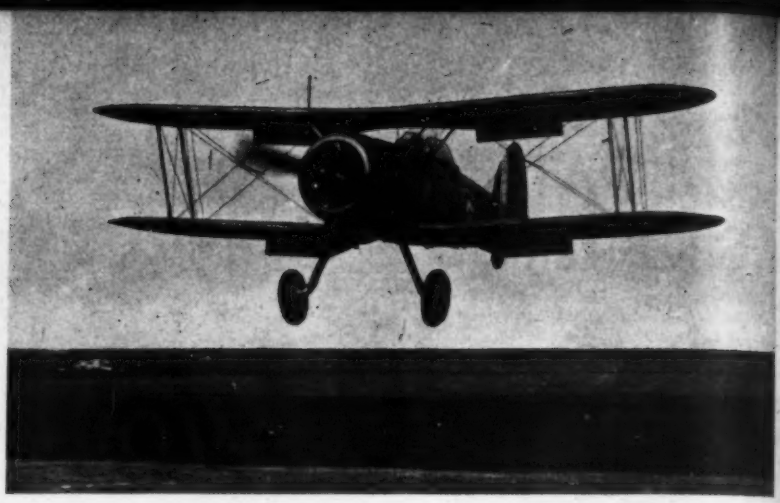
IT is reported that the United States are considering the conversion of large fast freighters into aircraft carriers capable of carrying 30 aeroplanes and that the first of these, the *Mormacmail* (7,860 tons) is now being altered by the U.S. Navy at Newport, Virginia. The *Mormacmail* belongs to a class of the biggest and fastest freighters and has a length of 492ft., a rated speed of 16½ knots and a range of 14,500 miles.

This class of ship should be very useful for convoy work as her speed, which can probably reach 18 knots in an emergency, should allow her to outpace or at least equal the speed of enemy submarines on the surface. Whether she would be capable of carrying 30 aircraft seems doubtful considering her tonnage. But even half the number could do a lot of good work round a convoy. The length of the flight deck is not great, but autogyros could use it with ease without the necessity of the ship steaming into wind. And it has seemed to us for some time that this craft would have great usefulness in hovering over a convoy and carrying a depth charge as a missile for a suddenly appearing submarine.

U-BOAT SPOTTER

Some New Photographs of the Saro Lerwick

ONE of the fast flying boats on service with the Coastal Command, the Saro Lerwick (two 1,375 h.p. Bristol Hercules engines), is doing excellent work as a long-range reconnaissance bomber. The Lerwick has gun turrets situated in the bow, amidships and aft, and each of these three is multi-gunned and power-operated. The interior photographs show the sending of an emergency message by carrier pigeon—a number of these birds are always carried in case of trouble—the flare rack and an aircraftman in the galley. In the flying view the excellent proportions of the boat are emphasised, while the taxying photograph brings out the disposition of the gun turrets and pilot's cockpit.



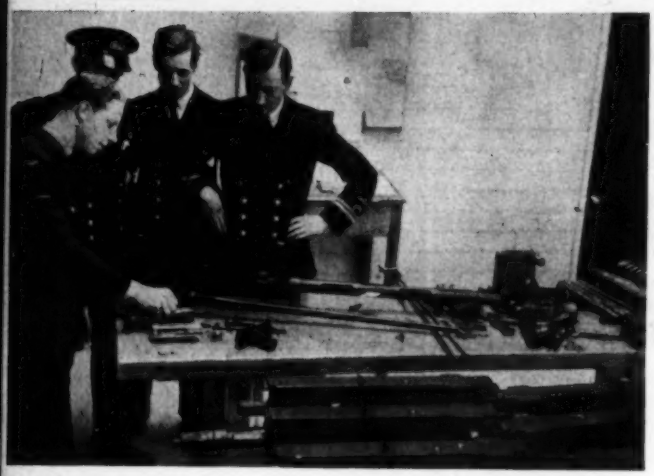
FIGHTER TRAINER : The four-gun Gladiator which has done such excellent work on all fronts is finishing its time as a training type.

FLEET

The Training of a F

THE WAVY NAVY : (Above) An R.N.V.R. pilot getting aboard a Fairey Fulmar.

IN THE ARMOURY : (Below) Browning .5s being stripped and overhauled.



FIGHTER pilots of the Fleet Air Arm receive their specialised final training under the watchful eyes of men who have been in action both in this war and the 1914-18 affair. With characteristic thoroughness the training is at once academic, practical and steeped in that spiritual quality peculiar to the Royal Navy.

In accordance with customary practice naval shore stations are named and run as ships. Captain H. S. Murray Smith, who flies his pennant in the establishment, first saw action in the Battle of Jutland as a snotty in the Dreadnought Bellerophon when he was perched on the roof of an unused turret. The chief flying instructor, Lt.-Commander Bramwell, wears the D.S.O. for his work at Dunkirk and in Norway, and even the Met. officer can tell tales of a cruiser north of Iceland with more than an inch of ice in the men's quarters and of Ju 88s dive-bombing in line ahead with the naval eight-barrelled "Chicago pianos" going flat out.

The stages of training a F.A.A. pilot are much the same as those for an R.A.F. pilot, with the exception of the final specialised training where single-engine training on T.S.R. types takes the place of twin-engined bomber practice.

First of all the potential pilots are posted to the St. Vincent as naval airmen 2nd class. Here they are taught such things as the theory of navigation, how to scrub a

PEGGED OUT : (Below) A Blackburn Skua under engine tent and cockpit cover at its dispersal point. Rugger fans may recognise the figure as a referee of happier days. He is now Lt. Allport of the R.N.V.R.

GOING BELOW : (Centre) Ratings marching to mess decks after the morning's flying.

floor, pull a service cutter, and discipline—especially discipline. The next few weeks are spent as an Acting Leading Airman at an Elementary Flying Training School where the pupil is taught to fly a Tiger Moth and later to do simple cross-country flights, blind flying and elementary aerobatics. While at the E.F.T.S. a man's day is usually split into two sections. Those who fly in the mornings attend lectures or other ground subjects during the afternoon, and those who spent their morning in a classroom, at the firing butts or in the Link Trainer, do their flying in the afternoon. The sequence of instruction in pilotage commences with "air experience" just to get the pupil familiar with the sensation of flying and to note the whereabouts in the cockpit of the various controls and instruments. Next he is taught to handle the

ETIGHTER

of a F for the F.A.A.

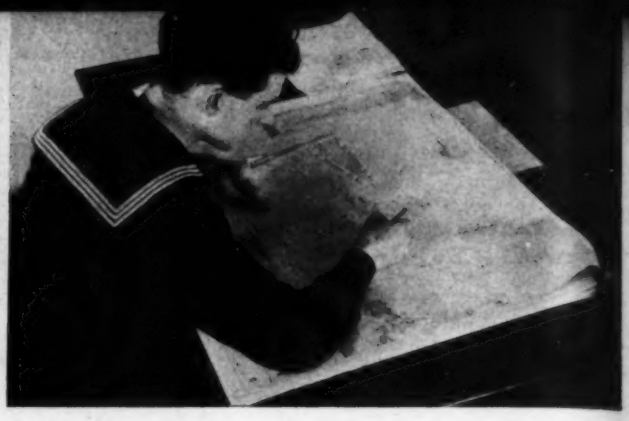
machine in the air, keep a straight course or make gentle turns. The technique of taxying on the ground is also learned at this stage. Steeper turns, gliding, take-offs, power on and power off approaches and landings come next with initiation into the gentle art of spinning before he is allowed to make that most momentous of all flights —the first solo. Having got over this terrific adventure the pupil returns to prosaic if more advanced flying such as side-slipping, low flying, steep turns, climbing turns, forced landings and landings intentionally out of the wind. At higher altitudes aerobatics are learnt, finishing up with loops, half-rolls and slow rolls. Ground instruction includes engines, rigging, theory of flight, airmanship, parachutes, air navigation, armament and signalling. The next flying period is spent mostly on Fairey Battles during a course at a service flying training school. All that has been done in a simple fashion at the E.F.T.S., and a lot more that has not, is here performed on service types. In a nutshell, the pupil is turned from just a pilot into a military pilot. It is here —if he is successful—that commissions are given and the permission to wear the "wings" is granted. This much-coveted decoration is worn above the mark of rank on the cuff in the F.A.A. and not on the left breast as in the R.A.F.

Having received his commission he is sent to Greenwich College for a period to be taught those things which a naval officer and a gentleman, should know. There is, of course, no other training in the world quite the same as this. *Esprit de Corps*, history and general duties of a naval officer, naval customs and traditions, handling

MODERN BIPLANES: Overhauling Fairey Albacores at a Fleet Air Arm station.

ALL SET: (Above) An instructor prepares to depart on a Fulmar. The four gun ports on the port wing are very apparent.

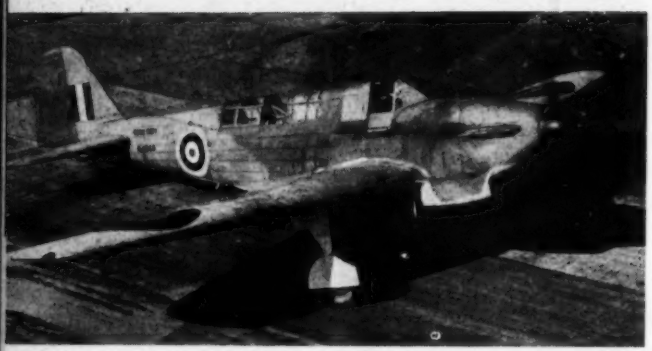
LAND CARRIER: (Below) Practising deck landing with a Fulmar on an aerodrome runway. The signal being given denotes the approach was right but do not bother to land, go round again.



SYNTHETIC BLIND FLYING: (Above) The Link Trainer which is used extensively for navigation exercises.

MET. MAP: A rating transfers weather reports to a map.

AERODROME CONTROL: (Left) A scene in the control office. The instrument on the right records the speed and direction of the wind.



of men and mess etiquette are typical examples of the subjects appearing on the curriculum.

By now a fully fledged pilot and naval officer, the pupil arrives for his final specialised training at the fighter school. The first period is spent learning the cockpit layout and drill of the Miles Master and Gloster Gladiator and also cockpit to cockpit R.T. procedure. This is all ground work. In the air he has dual instruction in Masters or Proctors, and flies solo in Gladiators. The next stage is dual formation flying in Masters and solo formation flying in Gladiators, some of the latter practices being carried out at heights requiring the use of oxygen. Having by now become more or less accustomed to fly in close proximity to other aircraft without hitting them, individual attacks on a target aircraft and section attacks on individual targets are attempted. At this stage pilots also go solo on Skuas and Rocs, and continue formation practice at oxygen heights. A degree of proficiency in these attack exercises having been acquired, section and individual attacks are practised with a camera gun in action so that the results can be checked.

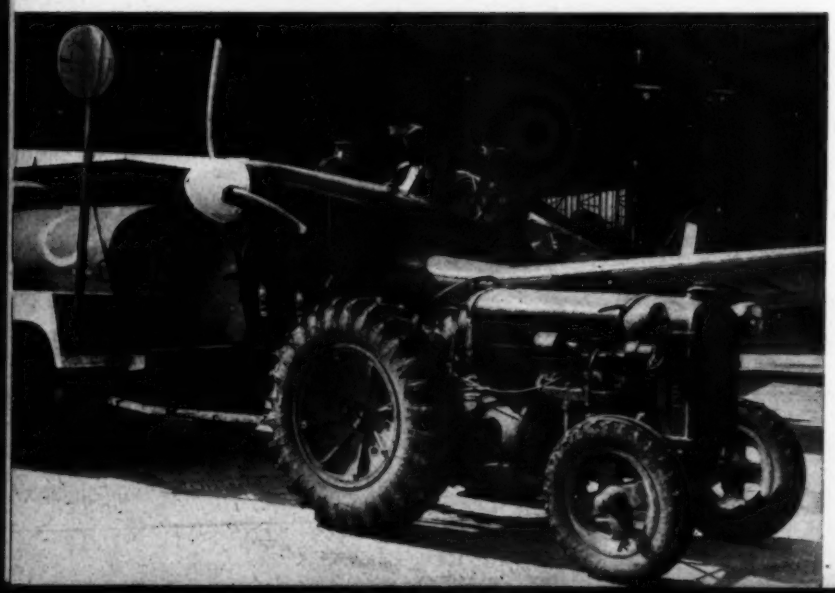
Final Training

Solo flying on Fulmars now commences, and dummy deck landings, interception exercises, dog fighting and formation attacks on multiple targets form the exercises for air training for the remainder of the course, with the exception of a period spent at an armament camp. At this armament camp air firing with ball ammunition against ground targets and against sleeve targets towed by Rocs are the major items for a fighter pilot to seek perfection in, but he also learns the gentle art of dive-bombing in case of future need.

The pilot is now fully trained and posted to one of the squadrons of the Fleet Air Arm Fighter Pool, which is, in effect, an operational training unit. Here with Fulmar, Skua, Roc, Buffalo and Martlet to fly, he continually practises all the operational exercises he has been taught until posting to an active service squadron.

For those of our readers who may contemplate entering the flying branch of the Royal Navy the method of entry will be of interest.

Every candidate has to join the



TAXYING OUT: (Above, Left) An eight-gun Fulmar fighter running out to the take-off point.

MAESTRO MAINTENANCE: (Left) General titivation and refuelling of a Fleet Air Arm Miles Master.

THE SPIRIT OF THE NAVY : Refuelling a Fairey Fulmar from a mobile tanker.

Navy in the ordinary way, and then can put forward a preference for the F.A.A. All must go through the ranks. Those accepted as prospective pilots in the F.A.A. must be of School Certificate educational standard and have a good knowledge of elementary trigonometry and mechanics. Those that are considered suitable are given temporary commissions in the Air Branch of the R.N.V.R.

FIGHTER FOR TWO : (Below) The Blackburn Roc is a two-seater fighter in which the rear gunner has a Boulton Paul four-gun power-operated turret. The top decking in the neighbourhood of the turret is articulated to allow for the traverse of the guns.

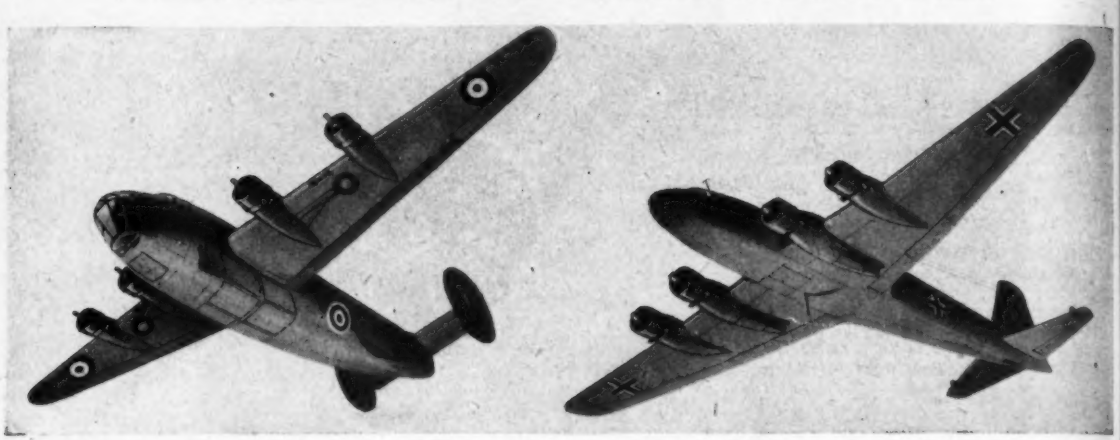
MASTERING THE MASTER : (Below) With flaps and wheels down a pupil brings in a Miles Master.

STAND EASY : (Above) A cup of tea and a bun is very welcome at six bells of the forenoon watch.

Sixteenth of the Series

FRIEND or FOE?

Four-engined "Atlantic" Rivals : The Liberator and the Condor



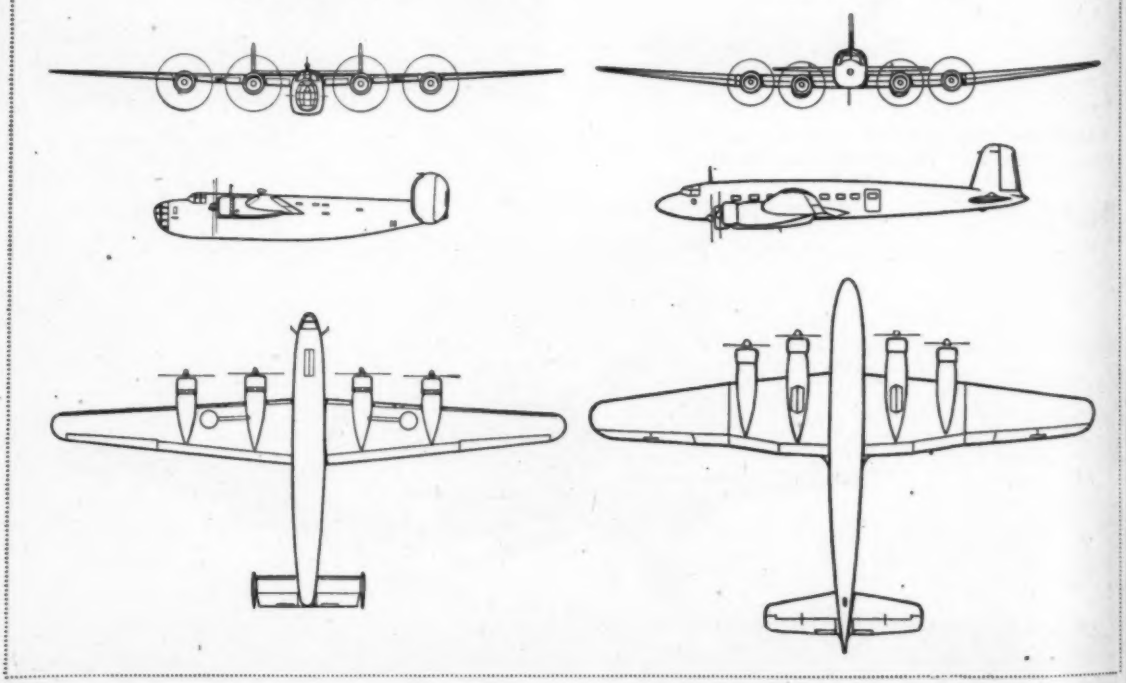
The Liberator : Cantilever high-wing of high aspect-ratio. Four radial engines. Deep, slab-sided fuselage, transparent nose ; retractable tricycle undercarriage. Rectangular tail-plane, oval twin fins and rudders outrigged

The Condor : Tapered low-wing. Four radial engines. Long shallow fuselage ; retractable undercarriage and tailwheel. Tailplane of deep chord with tapered leading-edge. Large fin and rudder of low aspect-ratio.

WITH a reputed range of something in the region of 3,000 miles, the Consolidated "Liberator," which is now arriving under its own power from America, is a very valuable addition to Great Britain's air strength, and will greatly increase our ability to drop more and heavier bombs well inside German territory. The Focke-Wulf Condor, originally designed as a civil air-liner, made a number of flights to U.S.A., and was used as a troop-carrier during the invasion of Norway. Further modified, and now a long-distance bomber, it is employed chiefly as an Atlantic raider against our shipping, although it has been reported over London on night raids. The armament of the Liberator may not be given, and that of the Condor is believed to be undergoing alterations.

From the point of view of similarity in appearance, the Boeing "Flying Fortress" bears a greater resemblance to the Condor than does the Liberator, since it is a low-wing aircraft with a single fin and rudder, but the Liberator is likely to be far more frequently seen in the immediate future, and, on an operational basis, there is little to choose.

The Liberator should be quite easily recognised. Its



wide-span wings of high aspect-ratio taper uniformly along both edges to small rounded tips and the transparent nose of its slab-sided fuselage, which will be seen from a side view to be of deep section, projects well ahead of its four radial engines, whose nacelles are flush with the upper surface of the wings. When seen from beneath it will be noticed that the wheels retract outwards into wing-wells between the engine nacelles and not into the inner nacelles, as is usually the case. The undercarriage is of the tricycle type, the forward wheel retracting into the nose. The Liberator's twin fins and rudders, which are large and oval in shape, are "outrigged" on the extremities of the rectangular, cantilever tailplane.

Apart from its small, pointed nose, the Condor has an angular appearance that is typically German. Its wing centre-section has a slight taper on the leading-edge, but on the trailing edge it has no taper for the first five or six feet, and then tapers sharply. The outer panel, however, has a uniform taper on both edges which is greater than the centre-section taper on the leading edge but less than the tapered portion of the trailing-edge—the net result being anything but graceful.

The mounting of its radial engines is also unusual and rather "untidy," the inner pair being set lower and projecting farther than the outer pair. The fuselage is long and shallow. The undercarriage retracts into the inner engine nacelles and the tailwheel also retracts. A long line of cabin windows extend from just aft of the pilot's enclosed cockpit to a point well aft of the trailing-edge.

Its tailplane is cantilever with a back-swept leading-edge and slight taper to the trailing-edge, and its single fin and rudder are noticeably large, being shaped like an inverted "U" with a flattened top and sloping edges.

Next week: Whitley and Junkers Ju 52.

THE ROYAL OBSERVER CORPS

Its Valuable Services Recognised : New Uniform Approved : Storm-proof Coat for Every Observer

CRITICS of the Observer Corps, some of whom complained, in recent letters to *Flight*, that the organisation was "nobody's baby," have their answer in the promotion of this valuable body to the status of The Royal Observer Corps as a well-merited recognition of the vital part it has played, and continues to play, in the air defence system of Great Britain.

With this new status come certain practical improvements which will go a long way to meet complaints on the treatment hitherto accorded to its members, particularly in reference to uniforms and equipment.

It has now been officially announced by the Air Ministry that "as soon as the supply position allows, a personal issue will be made to all Observers of a new pattern one-piece uniform which is an improvement on the present pattern and which can be termed somewhere midway between overall and battle-dress. This uniform has received His Majesty's approval."

Officers of the corps, it is stated, will retain their present uniform, which is of distinctive design, but will wear the letters "R.O.C." in white metal (to match their buttons) on the lapels of their tunics and on the shoulder-straps of their great-coats.

Sleeve Badges

The new uniform will have on the sleeve the woven badge of the corps instead of the police pattern armlet previously worn by Observers when on duty. In announcing the new uniform, the Air Ministry point out that the Royal Observer Corps is composed, for the most part, of members who go from their civilian occupations direct to their place of duty and that a uniform which can be slipped on over civilian clothes is, therefore, far more convenient than a two-piece uniform of the battle-dress type. To issue a uniform akin to that of the A.F.S. or the Home Guard, they maintain, would be "opposed to the principle, which must be maintained in the interests of public service and of economy, that uniform pattern should be governed primarily by function."

As regards protective clothing, a personal issue of storm-proof coats of the "Zeekee" pattern has now been approved for every Observer, whether whole or part time, and it is anticipated that an adequate supply will be available for this purpose before next winter. The issue of sou'westers, oil-skins and gumboots, however, will remain on the "Post" basis as at present.

Penny a Mile

Observers who live some distance from their posts and are obliged to travel to and from duty in their own cars will in future be granted a travelling allowance of 1d. per mile towards the cost incurred. This, however, is subject to the provisos that the distance each way is more than two miles and that public transport is not available. It is pointed out, incidentally, that the cost of travelling between home and place of duty is not allowable as a deduction from income for tax purposes.

Among other conditions of service laid down by the Air Ministry it has now been decided that Controllers and Assistant Controllers at R.O.C. centres shall be accorded officer status, shall be allowed to wear R.O.C. officer's uniform, and shall be eligible for the normal uniform grant. Furthermore, all officers of the corps will be allowed to travel first class when in uniform and on duty.

It has been suggested that the present status of the Royal Observer Corps, which is civilian in character, is anomalous and that it should be converted into a Service organisation and made part of the R.A.F. But the view of the authorities is that this would be inappropriate and would cause serious administrative dislocation, so it is to remain a civil organisation analogous to the Civil Defence Services. It will continue to be under the operational control of the Air Officer C.-in-C., Fighter Command, R.A.F., and be administered by the Air Ministry.

Another important point which has now been clarified is the legal position of members of the corps who, as crews at Observer Posts, have been issued with rifles for protection in case of attack. The Air Ministry has been advised that the Royal Observer Corps fulfils the conditions which, under international law, entitles individuals who bear arms to be accorded the rights and privileges of armed forces. These conditions lay it down that they must (a) be commanded by a person responsible for his subordinates; (b) wear a fixed distinctive sign, recognisable at a distance; (c) carry arms openly, and (d) conduct their operations in accordance with the laws and customs of war.

Legally Armed

But although the R.O.C. conforms to these requirements its does not follow, as has been suggested, that the personnel of the corps are, in effect, combatants. There is, the authorities state, no more reason for regarding the corps as a combatant force than other civilian services engaged in forestalling or mitigating enemy attacks on this country. In order to use their arms in defence—which is a matter of international law—members of the corps do not need to be soldiers or airmen subject to military or air-force law and discipline; the status of civilian, which is a matter of English law, is consistent with the bearing of arms.

Presumably one is invited to assume from this that the member of the Royal Observer Corps need not fear himself to be in danger of being shot as a *franc tireur* should he be captured by the enemy while bearing a rifle. That the enemy might conceivably disagree with this interpretation of international law is a point not touched upon.

THE AIRCRAFT ENGINEER

No. 182 16th Year

COMPOUND STRESS DIAGRAM

Summation of Direct Stresses and Shear Stresses Facilitated

By W. F. PROEHL

IN the summation of direct and shear stress, the equations,

Principal direct stress $= \frac{p}{2} \pm \sqrt{\frac{p^2}{4} + q^2}$ and

Maximum shear stress $= \sqrt{\frac{p^2}{4} + q^2}$

are frequently met with by those dealing with stress calculations. In the above formulae p represents the direct stress applied to an element of a material, which may be due to direct tension or compression or to bending, and q represents the shear stress due to direct shear or to torque.

The accompanying diagram considerably simplifies the above summation and enables one to visualise how these maximum stresses vary with the ratio of the shear stress to the direct stress.

Explanation of the Diagram

On a basic circle of 0.5 radius, drawn to any convenient scale, the tangential perpendicular line is drawn. This is graduated to the same scale as that to which the circle is drawn and on the accompanying diagram has subdivisions of 0.01. This scale represents the ratio—shear stress/direct stress. Around a portion of the basic scale, arcs are drawn to intersect the tangential perpendicular mentioned above. These are drawn with radii to the same scale as that of the basic circle. As shown the interspaces each represent 0.02, subdivided into 0.01. Any further subdivision of both the above scales may be done by eye On the arcs it will be noted there are two scales, one for the maximum direct stress and the other for the maximum shear stress. These values, it will be seen below, are factors giving these stresses in terms of the applied direct stress.

To Use the Diagram

Having determined the applied direct and shear stresses, find the ratio of the latter to the former, i.e.—express the shear stress in terms of the direct stress. Look up the value found on the shear stress/direct stress scale. Note the arc (or intermediate arc if it were drawn) which intersects the perpendicular at this value. Read off the factor on this arc, looking under the appropriate heading "Max. Direct Stress" or "Max. Shear Stress" according to which is required. Multiply the applied direct stress by this factor. This gives the required maximum stress.

Example

Suppose a material be subjected to a shear stress of 5 ton/in.^{2} and to a direct stress of 10 tons/in.^{2}. The ratio—shear stress/direct stress = 5/10 = 0.5, i.e. 0.5 tons/in.^{2} shear stress for each 1.0 ton/in.^{2} direct stress. Look up this value on the perpendicular. The arc which if drawn would intersect this point would have a factor of nearly 1.21 (or more accurately 1.207) on the max. direct stress scale and nearly 0.71 on the max. shear stress scale. Hence—

Max. direct stress = 1.21 × 10 = 12.1 tons/in. very approx, and

Max. shear stress = 0.71 × 10 = 7.1 tons/in. very approx.

Principle of Construction

Any equation of the form $\sqrt{\frac{p^2}{4} + q^2}$ can be solved graphically by drawing a right angled triangle having the sides adjacent to the right angle proportional to the square roots of quantities under the root sign. The hypotenuse will then give the solution when measured to the

(*Continued on p.* 303)

MODERN WING LOADING

The Desirability of High Loading in Civil Transport Design

By C. L. JOHNSON*

THE purpose of this paper is to investigate the effect of wing loading on transport airplane design. In discussing the general problem, every effort will be made to use numerous examples, keeping engineering terms and formulas to a minimum. It is hoped that by this procedure many misconceptions concerning the effects of wing loading on airplane design can be corrected in the minds of pilots, operators and designers.

The wing loading of an airplane is defined as the total gross weight divided by the wing area; in other words, it is a measure of what actual load each square foot of wing area is carrying under normal unaccelerated flight conditions. Wing loading affects the flight characteristics of the airplane in that the higher the unit weight to be carried by each square foot of wing the higher the speed at which the airplane must fly to sustain that load or the greater must be the angle of attack at which the wing meets the air. Values of wing loading vary from 3lbs./sq. ft. in gliders and birds to 60lbs./sq. ft. in racing type aircraft. At the present time, typical transport airplane wing loadings vary from 20 to 35lbs./sq. ft. of area.

Numerous Advantages

It has been unfortunate that many airplanes in the higher wing loading brackets have had poor flying characteristics for reasons not at all connected with wing loading. The most usual of these faults has concerned stalling characteristics. There is no fundamental reason why an airplane with high wing loading should have worse stall characteristics than those with low wing loading. In fact, due to the higher stalling speed actual control should be improved. A pilot can prove this to himself by merely flying a given airplane in a practically empty condition and also with full gross load, and note the difference in control obtained with the ailerons at the stall. On a typical plane it will be possible to change the wing loading by slightly over 20% in this method. It should be noted that here is a perfect example of the fact that the stall characteristics are *not* changed by wing loading in a given airplane.

The following table shows the variation in stalling speed for wing loadings varying from 10 to 100 lb./sq. ft. It is assumed that the same type of high lift flap is used in all cases. The fact that the stalling speed varies so slowly with wing loading is of utmost importance in determining the economic value of the airplane for transport use, as comparatively small changes of wing loading result in a great change of payload. Wing loadings may be safely

TABLE I

Wing Loading	Stalling Speed with High Lift Flaps
Pounds per square foot	m.p.h.
10	39.5
20	56.0
30	68.3
40	79.0
50	88.5
60	96.8
90	118.5
100	125.0

increased only when the power loading (weight per horse power) is decreased at the same time. In this way the take-off run, climb and airplane ceilings can be maintained or improved over the values now common to transport aircraft.

For every condition of flight except stalling there is some combination of power and wing loading that will give a constant performance. In other words, if it were not for limitations of stalling speed or landing, wing loadings could increase substantially to the great benefit of payload and performance. In a short time, power will be used for the landing and stalling speed conditions to control the airflow around the wing in such a manner that even the minimum speed factor will be a function of power. From this point onward there will be very little cause to consider limitations of wing loading such as are now considered unsafe. In view of all the discussions pertaining to wing loadings, it is well to ask the question—Who wants higher wing loadings and why? The answer is that everybody wants higher wing loadings, if safety is not sacrificed. The reasons are these:

a. Added performance will be obtained.

b. Smaller, lighter and cheaper airplanes will become available.

c. Added safety will result due to higher speed, greater range and better low altitude rate of climb.

d. Increased payload can be carried.

It is also well to ask—What steps are now being taken to make the use of higher wing loadings safe? The steps may be summarised as follows:

a. Improvements in airports and airway facilities will allow higher landing speeds.

b. The use of improved landing gears which will allow faster landings with better landing control and better braking.

c. Improvements in engines and propellers are being made available to give better power-weight ratios which improve take-off and emergency safety.

d. Great efforts are being directed to the study of stability, control factors, and wing stalling.

e. Improved wing flaps are being used and studies made on boundary layer control by the use of engine power.

f. Serious research studies are being undertaken on icing and related problems toward a solution for keeping airplane efficiency high under all possible conditions.

It is perhaps in the last field that development has been most tardy. This subject will be discussed at some length in this paper, as it is one of the critical factors affecting wing loading. Peering ahead, we might well ask what will future wing loadings be. It is almost foolish to try even to estimate such a factor. In view of the probable developments of boundary layer control, values of 70 lbs./sq. ft. will very likely be common within five years.

Like all other aircraft companies, the Lockheed Aircraft Corporation is vitally interested in determining the proper course to follow in future designs with regard to so important a subject as the wing loading problem. In this connection, a great deal of research has been carried out investigating wing flaps, icing problems, stability and associate aspects of design, including all safety and economic factors affecting this decision.

Factors Affecting Wing Loading

The problems related to wing loading which now face the aviation industry come under two broad groups. Flight problems include: 1, handling characteristics—landing speed, stability, manœuvrability; 2, take-off and climb performance; 3, icing effects; 4, pilot technique.

The economic problems are: 1, payload carried; 2, performance gained; 3, airplane initial cost; 4, operating costs for given speed; 5, hangar size, servicing problems; 6, crew required.

The preceding items will be discussed and enlarged upon by means of examples which cover the present design trend for the coming series of transport airplanes and also cover the type of equipment now being used. Too often, decisions are made regarding design problems without a

*Mr. C. L. Johnson is Chief Research Engineer of the Lockheed Aircraft Corporation. This paper is the result of research work done under his direction, and grateful acknowledgment is made to him and the company.

thorough study of all the factors involved. The problem at hand will be attacked in the following manner:

1. Two bi-motor airplanes will be designed to study current transport types. The first has a wing loading of 31.8 lbs./sq. ft. and a gross weight of 17,500 lbs. This airplane A has already been flying for quite some time, so its performance and weight characteristics are known exactly. For the low wing loading class, a second bi-motor, B, is designed, with a wing loading of 21.1 lbs./sq. ft. Both airplanes, to be comparable, must fulfil the following conditions:

(a) The airplanes must carry identical payloads the same distance when equipped with a given power plant. For the example considered, the payload is 3,775 lbs., the distance 950 air miles, and the engines Pratt and Whitney Hornets.

(b) Both airplanes meet C.A.A. requirements structurally.

(c) Both airplanes have the same stability. The airplane with the larger wing must have a correspondingly large vertical and horizontal tail. The fuselage length must also be greater, but due to the smaller relative C.G. travel on the lightly loaded airplane, the fuselage length does not vary directly with the wing span.

(d) The wing airfoil section and aspect ratio must be the same for both airplanes.

(e) The fuselage cross-sectional area is a constant

(f) Crew and passenger facilities are the same for both airplanes.

(g) Both airplanes have the same type of high lift wing flap and landing gear.

2. To study projected transport designs, two four-engined airplanes will also be considered. Four-engine airplane C has a take-off wing loading of 40 lbs./sq. ft. Airplane D is designed to have a 30 lbs./sq. ft. wing loading. Both four-engine airplanes have Wright G205A two-speed supercharger engines, and are intended to carry approximately 8,500 lbs. of payload 1,100 air miles at 250 m.p.h. cruising speed. The crew consists of 5 persons. Tricycle-type landing gears are used, and the Lockheed-Fowler flap. The four-engined aircraft meet the requirements of items (b) to (g) above.

It is of utmost importance to make careful weight analysis for all airplanes involved in order to keep the comparison valid. The airplanes with light wing loadings have naturally higher wing and tail weights than those of higher wing loading, although the weight per square foot of area is considerably less. To evaluate landing gear weight, care must be taken to use tyre and wheel sizes currently available. In some cases this will penalise one aircraft more than its competitor.

TABLE II.—PHYSICAL CHARACTERISTICS OF FOUR AIRPLANES STUDIED

Airplane	Two-engine Airplane		Four-engine Airplane	
	A	B	C	D
Engines	2 P & W Hornets	2 P & W Hornets	4 Wright 205A	4 Wright 205A
Rated b.h.p. and alt.	800 at 5000ft.	800 at 5000ft.	1000 at 4500ft. and 900 at 14,000ft.	1000 at 4500ft. and 900 at 14,000ft.
Gross weight—lbs.	17,000	19,000	40,000	45,000
Wing area—sq. ft.	551	900	1,000	1,500
Wing loading—lbs./sq. ft.	31.8	21.1	40.0	30.0
Power loading—lbs./b.h.p.	10.94	11.90	10.0	11.26
Empty weight—lbs.	11,000	12,340	25,330	29,100
Useful load—lbs.	6,500	6,660	14,670	15,900
Payload—lbs.	3,775	3,775	8,597	8,504
Range with above payload	950	950	1,100	1,100
Speed for above range—m.p.h.	215	198	250	250
Wing span—ft.	65.5	83.7	95	116.2
Wing area ratios	100%	163%	100%	150%
†Horizontal tail area ratios	100%	163%	100%	150%
†Vertical tail area ratio	100%	163%	100%	150%
Aspect ratio	7.78	7.78	9.03	9.03
Type landing gear	Normal	Normal	Tricycle	Tricycle
Overall length				
Change in wing weight—lbs.	—	800	—	1,860
Change in tail weight—lbs.	—	205	—	540
Change in fuselage wt.—lbs.	—	230	—	850
Change in gear weight—lbs.	—	85	—	270
Change in misc. weight—lbs.	—	20	—	250
Change in empty weight—lbs.	—	1,340	—	3,770
Approximate airplane cost	$80,000	$80,700	$253,000	$291,300

† Tail area ratio shown, expressed in terms of the basic tail areas of airplanes A and C, are required to keep stability factors constant.

MODERN WING LOADING (Continued)

For a given cruising speed, the airplane with the light wing loading requires more engine power and therefore more fuel than one with a higher wing loading. This subtracts from the net useful load. Table III gives a very complete study of various factors involved for two different operating problems of the four-engine airplanes.

The ranges taken for a comparative study are actual air miles flown against zero wind with no reserve fuel provided. Actual operating airline range would therefore be about 50% of the distances indicated in all cases.

Considering the above, it will be seen that the two-engine airplane with light wing loading is 1,500 lbs. heavier than the one with the high wing loading, while the corresponding figure for the four-engine airplanes is 5,000 lbs. A study of various similar airplanes will convince anyone interested in the

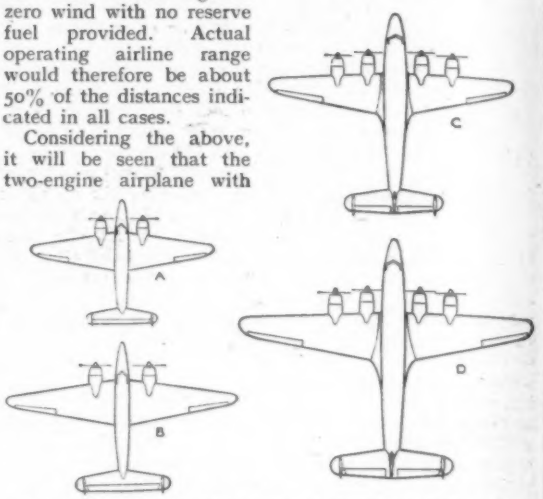


Fig. 1. Comparative plan forms of aircraft A, B, C and D.

	Wing Loading lb./sq. ft.	Span ft.	Length ft.	Gross Weight lb.
A	31.8	65.5	44.3	17,500
B	21.1	84	52.3	19,000
C	40	95	75	40,000
D	30	116	90	45,000

TABLE III.—COMPARISON OF RANGE AND PAYLOAD DATA ON FOUR-ENGINED AIRPLANES C AND D
Wing Loading v. Payload

		Airplane C	Airplane D
Gross weight		40,000 lb.	45,000 lb.
Empty weight		25,300	29,100
Useful load		14,670	15,900
Crew weights:			
2 pilots		340	340
Radio operator		170	170
Steward		150	150
Stewardess		130	130
Range data:			
Case A	Cruising speed—m.p.h.	250	250
	Cruising altitude—ft.	12,000	12,000
	Power required per engine—b.h.p.	650	790
	Fuel consumption—lb. per h.p.-hr.	.435	.45
	Fuel used per hour—U.S. gals.	189	237
	Miles per gallon of fuel	1.32	1.055
	Fuel required for 1,100 miles—gal.	833	1,041
	Oil carried for 1,100 miles—gal.	38	48
	Weight of fuel and oil for 1,100 miles	5,283	6,606
Case B	Cruising speed—m.p.h.	200	200
	Cruising altitude—ft.	8,000	8,000
	Power required per engine—b.h.p.	455	520
	Fuel consumption—specific	.42	.425
	Fuel used per hour—gal.	127.5	147.5
	Miles per gallon of fuel	1.57	1.35
	Fuel required for 1,100 miles—gal.	700	815
	Oil carried for 1,100 miles—gal.	32	37
	Weight of fuel and oil for 1,100 miles	4,440	5,168
Payload for 1,100 miles range at 250 m.p.h. at 12,000ft.—lbs.		8,597	8,504
Payload for 1,100 miles range at 200 m.p.h. at 8,000ft.—lbs.		9,440	9,942
Payload for 1,900 miles range at 200 m.p.h. at 8,000ft.—lbs.		6,200	6,163

MODERN WING LOADING (Continued)

accuracy of the preceding weight study. It is well to note the comparative dimensions of the airplanes involved from a point of view of hangar space required and also the selling prices. Current two-engine transport sell for approximately $7.30 per pound of empty weight, while the less numerous four-engine airplanes are available for about $10.00 per pound.

Handling and Performance Characteristics

Wing loading has little effect upon handling characteristics of the airplane except where maximum lift obtainable from the wing is involved. There is no reason why comparable stability and manœuvrability cannot be obtained equally well with the high wing loading as with the lower loadings now in use. The problems of stability can be approached in a very straightforward manner using theories already developed. There is an indirect effect of wing loading on stability that results from the use of higher power on the more modern airplanes. Many stability troubles common in the past were caused by the effect of power, and now, with relatively smaller wings and higher power, the percentage of the wing and tail span covered by the slipstream is increased. Improvements in testing technique have been of such a nature, however, that we have every right to expect very substantial improvements in control and handling characteristics of the next series of transport airplanes. Much research work has been done on these problems

Due to the development of low-drag high-lift wing flaps, the problem of manœuvrability at slow speeds and the actual landing speed problem has been kept well in hand. Most of the present types of transport airplanes are

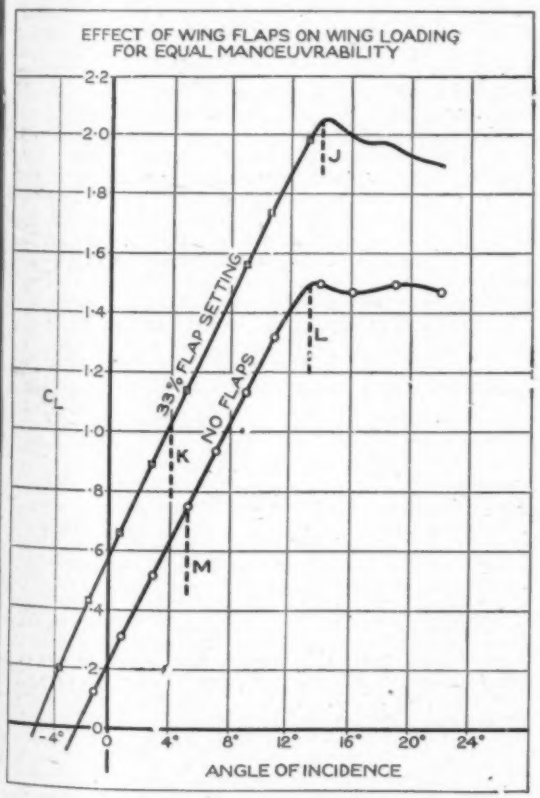


Fig. 2. Flaps and manœuvrability. Point J shows reserve lift for "2g pull-up" with 38 lbs./sq. ft. wing loading while K gives angle of incidence for 120 m.p.h. with the same wing loading and 1/3 total flap setting. L and M are corresponding points for 27.8 lbs./sq. ft. wing loading with no flaps.

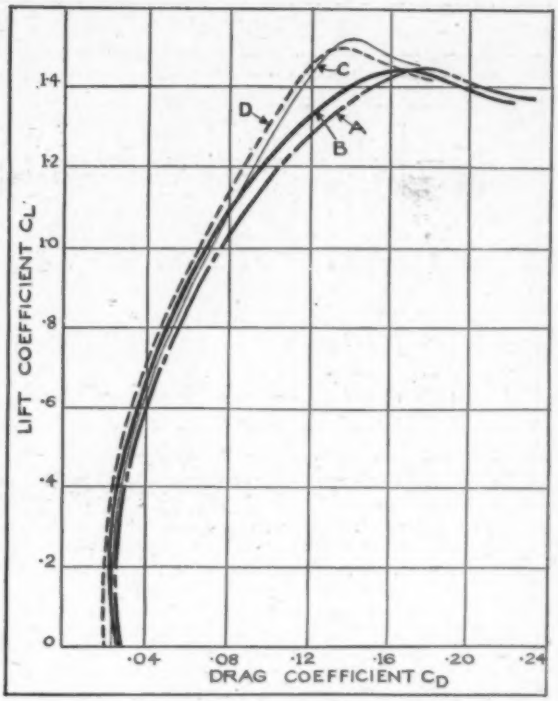


Fig. 3. Lift-drag curves for the four aircraft.

equipped with split-type wing flaps which are not of great benefit in improving manœuvrability at approach speed conditions. Transport airplanes now being designed will make definite use of flaps for manœuvring, so that it is in order to give an example of equivalent wing loadings for equal manœuvrability. See Fig. 2, which shows the lift obtainable at various angles of attack for an airplane with flaps retracted and a 27.8 lbs./sq. ft. wing loading, compared to the same curve for an airplane with modern flaps set for approach manœuvring condition. When flying at 120 m.p.h., the unflapped airplane has an angle of attack of slightly over 5°, and it has reserve lift to make a 2g pull up without stalling, for the wing loading of 27.8 lbs./sq. ft. The flapped airplane flying with one-third flap extension at 120 m.p.h is carrying 38 lbs./sq. ft. of wing area and has exactly the same manœuvrability in that it can make a 2g pull-up without stalling also. A 2g pull-up is equivalent to a 60° bank. This example shows the value of the proper flap type for manœuvring. The values of wing loading shown correspond roughly to the landing values for the four-engined airplanes having 40 and 30 lbs./sq. ft. take-off wing loading respectively. There is often considerable comment that, when the flaps are extended, the airplane will have a very low rate of climb, but this is not true for the example shown. With one engine inoperative the four-engined airplane with the 38 lbs./sq. ft. wing loading will have a rate of climb of over 600 ft. per min. at normal (not take-off) power.

The conclusion can be drawn that as far as handling characteristics and stability are concerned, higher wing loadings offer no serious problems. It might also be said that present manœuvring speeds can still be maintained on a well-designed airplane by proper use of wing flaps, although the limiting landing speed will increase slightly over values now in use. The latter factor is not considered serious when good stall characteristics are available, as they certainly must be, and when ample power is used to give good climb in emergency. The problem dealing in the effect of wing loading on rudder controllability has been thoroughly studied and does not show that any great difficulties will be encountered in obtaining rudder control after engine failure.

In order to evaluate the effect of wing loading on per-

MODERN WING LOADING (Continued)

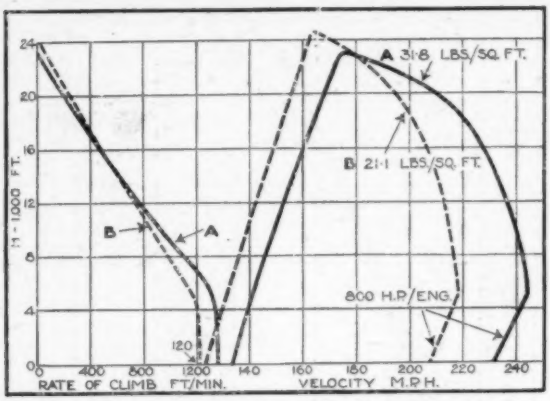


Fig. 4. Curves of comparative performance for A and B.

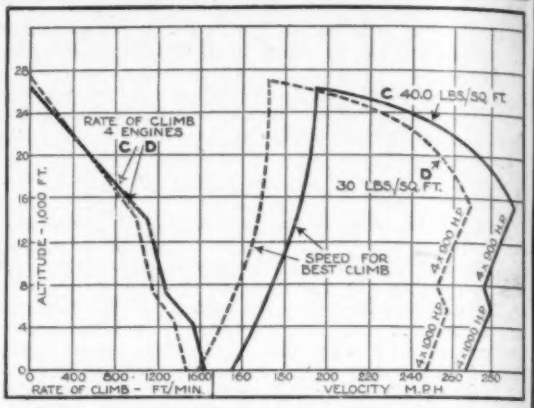

C 40·0 LBS/SQ FT.
D 30 LBS/SQ FT.
RATE OF CLIMB 4 ENGINES C, D
SPEED FOR BEST CLIMB
ALTITUDE - 1,000 FT.
RATE OF CLIMB - FT/MIN.
VELOCITY M.P.H.

Fig. 5. Curves of comparative performance for C and D.

formance and climb it is necessary to make a complete performance analysis of the four airplanes referred to above. Without discussing the details, the basic airplane characteristics are presented on the following two curves. The data shown applies to the full-scale airplanes, and it is based on a large number of wind tunnel and flight tests. While the airplanes with the lower wing loading have lower drag coefficients than those with higher loading, their total drag is considerably greater than the drag of the latter airplanes for almost every flight condition.

TABLE IV.—PERFORMANCE COMPARISON FOUR-ENGINE AIRPLANES C AND D
Wing Loading—Airplane C—40 lbs./sq. ft.
Wing Loading—Airplane D—30 lbs./sq. ft.

	Airplane A	Airplane B	Airplane C	Airplane D
			40 lb./sq.ft.	30 lb./sq. ft.
High speed at critical altitude —m.p.h.	245	218	294	268
Rate of climb, sea level—ft./min.	1,360	1,210	1,640	1,460
Absolute ceiling (all engines) ...	28,000	24,400	26,400	27,200
Absolute ceiling (A, B single engine, C, D 3 engines) ...	9,600	10,100	20,700	21,600
Stalling speed, flaps up... ...	90	74	102	88.5
Rate of climb on 3 engines at sea level—ft./min.	—	—	940	840
Stalling speed, flaps down ...	70	57	79.0	68.3
Speed for best rate of climb ...	135	124	155	140
Power required for 250 m.p.h. at 12,000ft. altitude—b.h.p.	—	—	4×650	4×790
Power required for 200 m.p.h. at 8,000ft. altitude—b.h.p. ...	—	—	4×455	4×520
Cruising speed at 65 per cent. power at 10,000ft.	215	198	—	—
Range with 350 U.S. gals at 65 per cent. power	950	875	—	—

The outstanding advantage of the heavily loaded airplanes in speed and climb at normal altitudes is very strikingly shown. In both cases the smaller airplanes with higher wing loadings are approximately 26 m.p.h. faster than their comparable designs with lighter wing loading. There is a slight difference in absolute ceiling in favor of latter designs, but the low altitude climb is better for the higher wing loading. The great difference in speed for a given power is an important factor in the economic operation of the airplane, particularly when it is considered that less fuel need be carried to go a given distance, and therefore the pay load can be increased. Airplane D, at a cruising speed of 250 m.p.h., will use 22% more engine power and a correspondingly greater amount of fuel than that used by Airplane C. The fuel alone for airplane D will run over three cents per mile more than that of Airplane C. When all factors are considered, including first cost and the effect of size on maintenance, the probable added cost per mile would give a differential of five cents. The engines for the lightly loaded airplanes must run continually at higher power outputs than that required for the higher wing loaded airplanes, so engine maintenance and reliability is actually affected directly. This gives an added safety margain to the airplanes with the heavier wing loading, and to this factor must be added also greater range, speed and climb. These additional safety margins help to compensate for a slight increase in landing speed.

The problem of take-off with heavy wing loadings may be solved by the use of higher power and take-off flaps. For the airplanes considered, the present C.A.A. take-off requirements will be met in all cases.

Reconditioned Clippers

NOT only has Pan American Airways ordered six new-type Boeing 314 Clippers for transatlantic service, the first one of which has now been launched, but the three original boats on this route, *Yankee*, *Dixie* and *Atlantic Clippers*, have been reconditioned and lightened so that they are now capable of carrying seven more passengers. The main improvements are the installation of improved lower-consumption Double Row Cyclones of 1,550 h.p. take-off rating, an increase of 50 h.p., Hamilton-Standard airscrews designed according to NACA laminar airflow research, and sponsons of improved shape containing larger fuel tanks. Tankage has been increased by 1,000 Imperial gallons, bringing it up to 4,500 gals., sufficient to give a range in still air of 4,000 miles.

As the harbour at Horta in the Azores is unusable in bad weather, Pan American desires to fly non-stop between Bermuda and Lisbon, and as this is 3,118 miles their new tankage allows them to do it with sufficient margin. Eastbound trips are usually helped by tail-winds, which give head-winds for the return. To avoid this the company wishes to fly from Lisbon to Bolama, in Portuguese Guinea (1,918 miles), and thence through Port of Spain and San Juan to New York. The application is at present being considered.

Defeating the Night Bomber

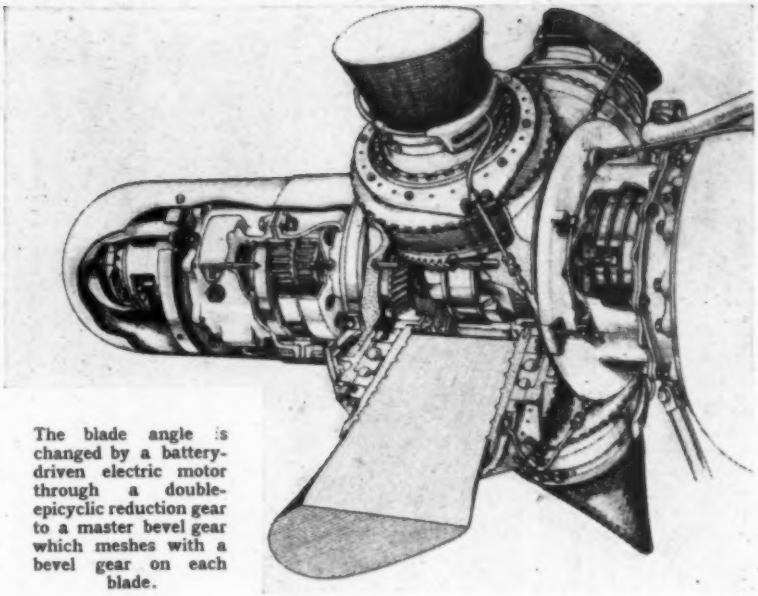
BRITAIN and Germany are engaged in a race to defeat the night bomber, a race in which headlights and detecting devices of a secret nature are playing their part. The ground searchlight has been left far behind in the race, so German fighters are now being fitted with them in the nose. And if the German official news agency can be believed, our own fighters also have them for helping to locate the enemy, for such is the German report. The German detecting device is known as a *Wolkenröntgen* apparatus, the name being derived from *Wolken*, clouds, and *Rontgen*, rays, which we refer to as X-rays; hence, "the apparatus which sees through clouds."

One should not be deceived, however, into thinking that the apparatus works with electromagnetic rays of the wavelength of X-rays, for it would not then have the range of the several miles which it must have in order to be of any use. Such rays are of extremely short wave length, of the order of one millionth of a centimetre, whereas the shortest radio wave which has so far been put to use is somewhat less than 10 cms. *The Saturday Evening Post* describes a radio beam with such a wavelength, generated by means of the Klystron radio tube which was developed by Stanford University and the Sperry Gyroscope Company. This beam is said to cut through static

AN "ELECTRIC FOUR"

New Addition to the Rotol Range

WITH the increase in power and performance of modern aero-engines and aeroplanes the variable-pitch airscrew manufacturer has had to face many problems in design. One of his difficulties has been to provide effective blade area and so maintain efficiency at these higher powers. Up to now three blades have been adequate for all purposes, but with limitations of blade diameter, additional blades have had to be considered, and a fourth blade is regarded as a necessity for the higher-power engines now coming along. (The reason why blade diameter cannot be increased indefinitely is that tip speed is thereby increased, and efficiency of the airscrew decreases suddenly as tip speed approaches the speed of sound. Another reason why large diameter is undesirable is that it decreases ground clearance or forces the undercarriage to be made taller.)



The blade angle is changed by a battery-driven electric motor through a double-epicyclic reduction gear to a master bevel gear which meshes with a bevel gear on each blade.

One of the problems of the airscrew designer has been to produce a variable-pitch hub with more than three blades, the size and weight of which would not be excessive. Recently Rotol Airscrews announced a four-bladed hydraulically-controlled variable-pitch airscrew, the hub diameter and weight of which were actually less than the equivalent three-bladed 35 deg. variable-pitch airscrew which is fitted to the latest Spitfires and Hurricanes. Now the company's latest development is a four-bladed electrically-controlled variable-pitch airscrew. The advantages of this type of airscrew were fully set out in an article, "Variable-pitch Airscrews," on page 124d of our issue of August 15th, 1940, and the mechanical design of the Rotol electric three-blader, which is the same as that of the four-blader, was described on page 168 of our August 29th issue. Both types have a booster for quick feathering. This raises the voltage so that the operation time for turning the blades edge-on is reduced to a few seconds. De-icing fluid is conducted to the leading edge of each blade by the "trough" system which can be seen in the illustration.

BOOK REVIEW

"Jane's All The World's Aircraft, 1940," by C. G. Grey and Leonard Bridgman. Sampson Low, £3 3s.

FOR the thirtieth time, *Jane's All The World's Aircraft* makes its annual appearance. This very useful book is up to the standard of past years with its complete catalogue of everything that flies and the engines that drive them as well. Its sections cover the historical side of military and civil aviation as well as the aeroplane and engine sections. A last pathetic section, for such is the present state of airship work, is of only one page. It will never be larger until peace comes once more. The photographs, drawings and silhouettes maintain the book's high standard.

Whether this will be the last issue which Mr. Bridgman will be associated with we do not know, but it is believed that he had resigned before publication. Even if Mr. Grey's name were not on the cover, those who are familiar with his writings would unfailingly recognise his touch. Mr. Grey will have it that Russia is the U.R.S.S. and not the U.S.S.R., while it seems to us that the point is not worth bothering about in a technical work such as this. However, if everything is to be pedantically correct we wonder why, a few lines farther on, Airacobra is spelled wrongly as "Aerocobra." The abbreviation "J.A.T.B.," the last letter apparently a misprint, rather jarred when found to stand for "Joint Air Training Plan," the Grey name for the Empire Air Training Scheme, or, as it is sometimes called, the British Commonwealth Air Training Plan. Mr. Grey's comment about U.S.A. "supporting the war financially to the last Englishman" got him excellent publicity but will not cause any bigger ripple in international affairs than his views on the ethnology of the Balkan Slavs which he must, it seems, display at all costs.

Good features in the book are maps of the air relationship of the parts of the British Commonwealth, the air routes in U.S.A., a table of comparative speeds at the same altitude of British, German and American fighters, and a table of German military aircraft and their characteristics. Accepting Mr. Grey's invitation, we point out a few small errors which caught our eye: "existance" for "existence" in the preface; "Douglas DB-19" for "B-19" on page 187c; and "twin-engined Excalibur" for "four-engined" on page 202c. For those who require a reference catalogue for aircraft, the book is essential; it has no competitors. Might we, however, plead with the publishers of this three-guinea book for a thumb index; it would facilitate reference very greatly.

COMPOUND STRESS DIAGRAM

(Continued from page h)

same scale as that to which the other two sides have been drawn.

In the diagram the horizontal radius of the circle is the base of one such triangle and its length to scale represents $\frac{p}{2}$. The perpendicular forms the second side and q is measured off on this in terms of p. The hypotenuse of this triangle, i.e., a line from this height q to the centre of the circle gives us the solution of our equation $\sqrt{\frac{p^2}{4} + q^2}$ in terms of p. Hence to get the max. shear stress it is now only necessary to multiply the length of the hypotenuse by the applied direct stress p.

The max. direct stress $= \frac{p}{2} + \sqrt{\frac{p^2}{4} + q^2}$ is greater than the above by $\frac{p}{2}$, i.e., by the radius of the basic circle. Hence this is given by measuring the hypotenuse extended beyond the centre of the basic circle up to its circumference. This length is also in terms of p. Hence the max. direct stress is this length multiplied by p.

Service Aviation

Royal Air Force and Fleet Air Arm News and Announcements

POLISH-AMERICAN REVIEW: Mr. Anthony Biddle, American Ambassador to Poland, inspecting a Polish fighter squadron of the R.A.F.

New Status of W.A.A.F.

IN answer to a question in the House of Commons recently, Captain Balfour, Under Secretary of State for Air, stated that the Women's Auxiliary Air Force will be given full Air Force Status. He also revealed that it is proposed to increase considerably the strength of the Force. Since its introduction as a separate body in June, 1939, the W.A.A.F. has steadily expanded both in numbers, and in the scope of its duties. From only a few trades, mainly of the domestic kinds, the activities of the W.A.A.F. now include more than a dozen technical and semi-technical trades, as well as such work as cooking, sick room attendance and driving.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy. The number after each name indicates the squadron with which the recipient is serving:—

SECOND BAR TO THE DISTINGUISHED FLYING CROSS.

Act. Sqn. Ldr. R. R. S. TUCK, D.S.O., D.F.C.—No. 257.—This officer has displayed conspicuous gallantry and initiative in searching for and attacking enemy raiders, often in adverse weather conditions. Since December, 1940, he has destroyed three enemy bombers and one fighter, thus bringing his total victories to twenty-two.

DISTINGUISHED FLYING CROSS.

Act. Sqn. Ldr. K. O. BURT—R.A.F.V.R. No. 82.—In March, 1941, this officer was detailed to carry out an operational sweep over the Ems Estuary. Sighting an enemy patrol vessel, Sqn. Ldr. Burt immediately attacked and, in the face of heavy and accurate anti-aircraft fire, dropped his bombs and machine-gunned the ship from a height of only 500 feet. Although the controls of his aircraft were severely damaged and the hydraulic gear rendered useless, Sqn. Ldr. Burt flew safely back to base and made a successful landing without sustaining damage or injury to the crew. He has completed numerous operational missions and has at all times set a splendid example of courage and determination.

F/O. R. A. CHISHOLM—A.A.F. No. 604.—This officer has completed many hours operational flying at night. He has at all times shown the greatest keenness and determination to seek and destroy the enemy and, during one night in March, 1941, he succeeded in destroying two Heinkel 111s.

P/O. D. C. MILLING—R.A.F.V.R., No. 242.—This officer has participated in numerous engagements against the enemy over a long period and has shown a fine spirit throughout. On one occasion he pursued a Junkers 88 out to sea and, although his aircraft was severely damaged by a cannon shell early in the pursuit, he continued his attack until the enemy aircraft was on fire and disappeared into cloud 40 miles out at sea. He has displayed great courage and initiative, and has destroyed at least four enemy aircraft.

P/O. THE HON. B. D. GRIMSTON—R.A.F.V.R., No. 149.—One night in March 1941, this officer was detailed to attack targets at Bremen. Before reaching his objective he was attacked by a Messerschmitt 110 while held in the beams of a large number of searchlights. P/O. Grimston, with great skill resisted the attacker, which was eventually driven off. He then flew on to his target and carried out a successful attack in the face of intense anti-aircraft fire. He has at all times shown exceptional gallantry and a keen determination to complete his mission regardless of the opposition.

P/O. A. J. HODGKINSON No. 219.—This officer has carried out numerous operational flights. He has destroyed at least three enemy aircraft, of which two were destroyed at night. His eagerness to seek and destroy the enemy at night has set a splendid example to his fellow-pilots.

P/O. L. R. STEPHENS, R.A.F.V.R., No. 38.—One night in March, 1941, this officer was detailed to attack a large concentration of enemy aircraft on the aerodrome of El Makina. Owing to ground mist the location of the aerodrome was very difficult to find, and, after searching for two hours, Pilot Officer Stephens had to descend to five hundred feet before identifying the target. He pressed home his attack from a height of one thousand feet in spite of heavy anti-aircraft and machine-gun fire, and destroyed five enemy aircraft and damaged others. This officer displayed great courage and set a magnificent example of leadership and devotion to duty.

P/O. G. A. DENBY, R.A.F.V.R., No. 600.—One night in February, 1941, whilst on patrol this officer sighted a Heinkel 111 flying across his bows, and by determined and accurate attack he shot it down. Previously he has attacked and probably destroyed two other hostile aircraft at night. Pilot Officer Denby has taken part in numerous operational night flights, often in bad weather, and his zeal and initiative in these duties have been an inspiration to all.

P/O. R. A. ESLER, R.A.F.V.R., No. 149.—One night in March, 1941, this officer was the observer of an aircraft detailed to attack the German cruisers *Scharnhorst* and *Gneisenau* in the harbour at Brest. In view of the extreme darkness he was not able clearly to identify the ships, although he could pick out the position where they were reported to be. After searching for some time, in the face of intense anti-aircraft and searchlight activity, he directed his pilot to run in at 8,500 feet, from which height he dropped a stick of bombs and made a reconnaissance. Determined to obtain proof that the ships were there he repeated this operation twice from altitudes of 8,500 and 7,000 feet, and this proof was obtained. On other occasions this officer obtained first-class bombing results on Venice, Cologne, Bremen and Wilhelmshaven. The success of these missions was due to his great coolness, perseverance and courage.

Act. Sqn. Ldr. C. P. GREEN, A.A.F., No. 91.—This officer has shown marked powers of command, organisation and initiative. He has personally led a great number of sorties, and on several occasions his fine fighting spirit has led to the destruction of the enemy. He has personally destroyed at least two enemy aircraft, and his devotion to duty has contributed largely to the outstanding success of his squadron.

F/O. F. D. HUGHES, R.A.F.V.R., No. 264 Sqn.

DISTINGUISHED FLYING MEDAL.

Sgt. F. GASH, No. 264.—Flying Officer Hughes and Sergeant Gash as pilot and air-gunner respectively have participated in numerous engagements against the enemy, both by day and night. During these fights four enemy aircraft have been destroyed, of which two were shot down at night.

Sgt. B. J. JENNINGS, No. 19.—Sergeant Jennings has destroyed two enemy aircraft, and has probably destroyed six others. The higher number of probable victories is due to this airman's unselfish conduct in continuing his action against the enemy, often in the protection of other members of his squadron, rather than attempting to confirm his probable victories. He has led a section of his squadron most capably, and has at all times displayed the utmost tenacity and determination to engage the enemy.

THE KING has been graciously pleased to approve the following awards:—

GEORGE MEDAL.

Act. Flt. Lt. J. W. SIM, R.A.F.V.R.—This officer has shown keen devotion to duty and has consequently dealt with unexploded bombs. As he lacked special training and experience in dealing with bombs, he displayed outstanding courage and initiative.

Act. Sgt. S. BOYS.—This airman is in charge of the station fire tender. During a night in September, 1940, he was ordered to proceed to an aircraft which had crashed in flames. Although the aircraft was known to be loaded with bombs, and enemy aircraft were overhead, this airman

GOOD SHOOTING: Sqn. Ldr. R. R. Stanford-Tuck, D.S.O., D.F.C. and Bar has now been awarded a second Bar to the D.F.C. The miniature swastikas indicate his victories.

SERVICE AVIATION (Continued)

drive his fire tender up to the crash and manned the hose himself and succeeded in extinguishing the fire. The crew had descended by parachute. In October, 1940, he again proceeded to the scene of a crash, and although he did not know if the aircraft was loaded with bombs, he manned the hose himself and succeeded in extricating one member of the crew alive; the other two were killed. In November, 1940, he drove his fire tender through thick fog to the scene of another crash, and knowing that there were bombs in the wreckage (one having already exploded), he once more manned the hose himself and put out the fire. By his prompt and courageous action on this occasion he saved the lives of two of the crew. He has displayed a complete disregard for his personal safety, and by his courageous actions has saved the lives of three people and set a magnificent example to the men under his control.

BRITISH EMPIRE MEDAL.

Cpl. G. W. GAZELEY.—In spite of lack of special training and experience, this airman, on a night in October, 1940, assisted in locating and dealing with three unexploded bombs. Cpl. Gazeley showed outstanding courage and disregard of danger.

A/C1 A. L. WATKINS.—In December, 1940, an aircraft crashed on an aerodrome and immediately burst into flames. Without hesitation A/C. Watkins jumped on to the blazing aircraft, assisted the pilot clear of the wreckage, and put out his burning clothing. The presence of mind and courage of this airman undoubtedly saved the pilot from being severely burned and possibly from being killed. The aircraft contained ammunition which started to explode shortly after the pilot was clear of the wreckage.

Roll of Honour

Air Ministry Casualty Communique No. 65.

THE Air Ministry regrets to announce the following casualties on various dates. The next-of-kin have been informed.

KILLED IN ACTION (WHILE FLYING IN OPERATIONS AGAINST THE ENEMY.—Sqn. Ldr. A. H. Allen, 05233; Sgt. R. Bryson, 745373; Sgt. A. A. Chartenshaw, 745616; Sgt. D. J. Capel, 759110; Sgt. W. R. Catling, 901844; Sgt. H. Chapman, 522572; Sgt. E. R. Cooke, 967092; P/O. C. R. Dugdale, 84034; P/O. W. H. Edwards, 81033; Sgt. W. J. Greaves, 971158; Sgt. R. D. Harris, 741445; Sgt. H. W. Hemingway, 547503; Sgt. J. W. Horobin, 776365; P/O. A. Kershaw, 91191; Sgt. H. F. Linley, 522558; Sgt. E. A. Lown, 911887; Act. F/O. J. O. Mair, 78277; F/O. H. V. Matthews, D.F.C., 33389; Sgt. A. Parsons, 808419; Sgt. H. C. Redgrave, 743047; P/O. I. M. Shirlaw, 81054; Sgt. H. C. Street, 751912; Flt. Lt. K. S. F. Tyas, 80037; Sgt. R. Warren, 754029; Sgt. N. Watson, 7548577; Sgt. R. D. Welch, 747764; Sgt. W. Wood, 751856.

PREVIOUSLY REPORTED MISSING BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. T. H. Borg-Banks, 41659; L.A/C. R. J. McEleavy, 541082.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. D. Atack, 581239; P/O. W. L. Ather, 44226; Act. F/O. T. M. Bardolph, 78695; Sgt. V. St. G. Barrow, 742271; Sgt. F. W. Batchelor, 563051; Sgt. G. E. Bloor, 633207; A/C1 J. Bridge, 620409; Sgt. R. H. Brown, 561051; P/O. R. M. Buchanan, 42556; Sgt. S. L. Butterfield, D.F.M., 563441; Sgt. J. J. Crabtree, 523092; Sgt. A. E. Craig, 758376; F/O. R. K. Curzon, 70156; P/O. C. H. Dearden, 41677; Sgt. W. Dixon, 751897; Act. Sgt. E. L. Dodd, 746988; Sgt. E. A. Downham, 580712; F/O. F. E. R. Ducker, 70191; Sgt. H. G. J. Gannaway, 627060; P/O. J. D. Goods, 40691; P/O. H. Haswell, 72482; Sgt. G. Hawkins, D.F.M., 510166; F/O. P. A. Hawks, 25078; F/O. J. F. J. Haworth, 59734; Act. Flt. Lt. H. B. L. Hillcoat, 90256; P/O. R. M. Hogg, 33486; P/O. A. D. Hopkin, 36220; Sgt. H. W. Hunt, 580545; Sgt. R. G. Ireland, 529709; Sgt. L. R. Isaac, 748153; Sgt. T. J. Jervis, 551360; Sgt. L. Jowitt, 562160; Sgt. D. A. Keetley, 747771; Sgt. A. W. Lamont, 523170; L.A/C. W. F. Lawes, 567002; P/O. C. Light, 33479; Flt. Lt. B. MacCallum, 37723; Sgt. J. McLean, 523836; P/O. G. A. Madore, 42143; Sgt. B. J. Mahon, 635470; F/O. J. E. Mahony, 39237; Sgt. R. B. Martin, 751104; Sgt. G. E. Maydon, 538737; Sgt. F. G. Mills, 740119; P/O. E. C. Minchinton, 40555; Sgt. B. Moriarty, 515346; Sgt. W. J. Neville, 741783; Sgt. S. J. Newcombe, 746922; P/O. L. L. Pyman, 72586; Sgt. K. G. B. Pew, 526687; Sgt. T. J. Rowles, 581474; Sgt. R. B. Sim, 742609; F/O. R. C. Simmons, 39344; Sgt. D. H. Simpson, 755136; Sgt. D. C. Sinclair, 615325; Sgt. J. G. Stanley, 581359; Flt. Sgt. J. H. Tanner, 565125; Flt. Sgt. T. M. Vaughn, 590381; Sgt. J. J. Whitfield, 526295.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. W. A. Bracher, 545538; Sgt. F. A. R. Wheeler, 742136.

WOUNDED OR INJURED IN ACTION.—Sgt. R. G. Aedy, 568825; F/O. D. D. M. Butcher, 42047; Sgt. W. A. W. Cox, D.F.M., 637525; Sgt. H. Foulkes, 527449; L.A/C. R. V. Jones, 611397; Sgt. H. W. Morton, 818184; Flt. Sgt. R. Y. Powell, 560880; Sgt. F. Rogers, 528400; A/C.2 J. Thompson, 1063558; Sgt. D. P. Vanderverd, 748447.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. J. Huffinley, 632878.

MISSING BELIEVED KILLED IN ACTION.—Sgt. W. J. Chamberlain, 549631; Sgt. J. H. Collopy, 566133; Sgt. E. J. Coult, 539886; F/O. W. P. Crosse, 41154; Sgt. D. A. D. Crouch, 755399; Sgt. J. J. H. Deacon, 745339; Sgt. V. T. Essex, 755112; F/O. J. H. T. Foxton, 41575; P/O. T. B. Garland, 79565; Sgt. K. Good, 758181; Sgt. E. H. Goodall, 935854; Sgt. B. P. Hall, 758066; Sgt. V. Hallas, 553968; Sgt. J. W. Hammond, 944304; Sgt. H. Howell, 631240; Flt. Lt. D. T. Johnston, 39319; P/O. D. F. Knight, 85691; F/O. F. H. Long, D.F.C., 36190; Sgt. W. J. Manger, 910906; Sgt. W. A. Millar, 748196; A/C.1 G. Morris, 639045; Sgt. G. G. Prescott, 572331; Sgt. E. Richardson, 751536; Sgt. P. A. Savage, 745970; Sgt. W. L. Smith, 945932; Sgt. H. A. Spyer, 745513; P/O. L. E. Stannard, 90748; Sgt. L. Stewart, 748297; F/O. P. J. Swain, 82500; Sgt. A. J. W. Ward, 754591; Sqn. Ldr. A. M. Watts-Read, 16253; Sgt. N. S. Weir, 970663; Sgt. W. G. Williams, 540821.

MISSING.—Sgt. D. W. Arkwright, 745517; Sgt. F. H. Baldwin, 935264; P/O. R. H. F. Blandy, 83740; Sgt. C. G. Brett, 580758; P/O. A. Bridson, D.F.C., 36267; P/O. C. R. Brown, D.F.C., 83727; Sgt. R. Cherrington, 550234; Sgt. E. P. Collingborn, 527299; P/O. E. Collis, D.F.M., 87034; Sgt. D. C. Craig, 974166; Sgt. J. G. Crawford, 745258; P/O. E. D. Dear, 82695; Act. Flt. Lt. J. Dickinson, D.F.C., 79538; Sgt. S. W. J. English, 958277; Sgt. C. W. Fry, 755511; Sgt. C. Gillespie, 971685; Sgt. S. D. S. Goodlet, 973901; Sgt. L. R. Hawley, 742914; Grp. Capt. D. d'H. Humphries; Sgt. S. H. A. Jess, 635446; Sgt. N. F. Johnson, 646573; Sgt. H. Jones, 973995; Sgt. B. Lee, 519834; P/O. W. H. Leedon, 43103; Sgt. G. Loughlin, D.F.M., 634506; Sgt. W. G. Marett, 639154; Sgt. H. E. Meason, 939016; Sgt. J. R. Miller, 642185; Sgt. C. W. Minn, 975720; Sgt. W. J. Morgan, 631925; Sgt. R. Mower, 755552; Sgt. D. C. Murrell, 745143; Sgt. S. Newman, 811173; P/O. G. R. H. Newton, 43110; Sgt. F. P. H. Oatley, 745081; Sgt. J. Orr, 754090; Sgt. J. M. Oxley, 759253; Sgt. E. G. Prettyman, 749386; Sgt. C. B. Rogers, 900955; Sgt. W. J. Savage, 944281; Sgt. H. Sheard, 638019; Sgt. N. R. Skinner, 903147; Sgt. R. H. Smith, 938066; Sgt. D. A. Smithies, 754932; Sgt. S. W. Snoddon, 745109; Sgt. F. Stones, 975763; Sgt. K. H. A. Vaughan, 970952; F/O. T. O. Walker, 40769; Sgt. C. G. H. Ward, 751296; Sgt. F. White, 618714; Sgt. C. Whitehill, 581251; Sgt. D. P. Williams, 970459; Sgt. W. E. Williams, D.F.M., 645116.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE (WHILE ENGAGED ON NON-OPERATIONAL FLYING DUTIES OR ON THE GROUND THROUGH ENEMY ACTION).—Flt. Lt. F. Austin, 39627; Sgt. D. F. Cade, 954211; Sgt. J. A. Entwistle, 977325; L.A/C. J. J. Gawne, 646774; L.A/C. H. W. L. Holder, 922605; L.A/C. T. B. Hunt, 988478; L.A/C. H. C. Jones, 912121.

KILLED ON ACTIVE SERVICE.—Sgt. R. S. S. Aitken, 987469; A/C.1 G. Akers, 984118; Sgt. B. Badcott, 906058; P/O. J. L. Baines, 88686; Sgt. F. R. P. Burgess, 1162683; A/C.1 L. R. J. Buxton, 909809; A/C.2 W. E. Chalmers, 1260576; Sgt. H. H. D. Cox, 571382; P/O. W. F. Crockart, 91231; Sgt. R. H. M. Crook, 905218; A/C.1 P. J. Dennis, 984855; A/C.2 A. R. Downs, 1311292; Cpl. J. F. W. Dunn, 534755; Sgt. R. C. Durbridge, 754753; L.A/C. B. A. Fleming, 1001944; P/O. R. J. Fuller, 83722; Sgt. C. H. Funnell, 550362; P/O. I. S. O. Gaze, 60097; Sgt. W. Hewish, 538041; Sgt. P. R. Hill, 1153385; Sgt. J. Hocknell, 748123; Sgt. B. J. Holden, 650357; Sgt. R. Ibbotson, 754529; Cpl. N. G. Jones, 348270; Sgt. E. J. Livermore, 748650; L.A/C. G. W. Lygo, 927860; Sgt. E. G. Mason, 742456; Sgt. L. G. Mitchell, 817187; Sgt. V. Moore, 755356; L.A/C. J. H. Morgan, 1253787; Sgt. D. C. Morrison, 924185; F/O. E. W. Padfield, 33480; Sgt. G. T. Powell, 741271; Sgt. K. E. F. Purcell, 754064; A/C.2 J. Rafer, 1214117; A/C.2 S. W. Rogers, 847201; L.A/C. H. G. Seaton, 1052110; Sgt. J. N. Senior, 748662; Sgt. D. G. Sims, 958216; P/O. E. J. W. Sivers, 88656; Flt. Lt. H. A. Smith, 37185; P/O. O. J. G. Stevens, 89807; L.A/C. J. A. Swinburne, 1053734; P/O. A. D. Thomas, 89768; A/C.1 T. Todd, 1056626; A/C.2 C. G. Tomlinson, 1068504; Sqn. Ldr. R. A. E. Traill, 36018; A/C.2 T. F. G. Turness, 923932; L.A/C. E. W. Ward, 1195594; P/O. M. K. Warren, 79560; A/C.1 J. S. Webb, 841347; P/O. R. C. Webb, 88716.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—A/C.1 F. V. Adams, 613953; A/C.1 L. H. Bellingham, 618700; Flt. Sgt. A. Burrows, 349996; A/C.2 J. Churchard, 976350; A/C.1 R. W. Dickson, 537403; A/C.1 H. H. Gardiner, 548223; A/C.2 G. Harris, 626479; L.A/C. G. E. Humphreys, 636004; A/C.1 J. B. Hutchison, 632128; Cpl. C. T. Keyte, 531194; P/O. J. McCash, 78977; A/C.2 A. R. Macintyre, 967706; Cpl. C. V. Murton, 352515; L.A/C. J. R. Russell, 550667; A/C.2 H. Townend, 702903; Act. Sgt. M. L. Tully, 504904; L.A/C. A. A. Webber, 551636; L.A/C. A. Wheeler, 507360; Sgt. J. T. Whitelam, 509797; L.A/C. A. P. Whiteman, 334948.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—L.A/C. G. A. Mitchell, 812090; A/C.1 L. V. Pepper, 627043; Sgt. N. J. Sparks, 754915.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.2 R. D. Beddow, 777854; A/C.2 S. Broadbent, 1016875; A/C.2 H. M. Eales, 1176870; A/C.2 D. P. Fell, 650714; L.A/C. G. A. F. Hignell, 626328; L.A/C. T. W. Hollidge, 752379; A/C.2 F. Ingham, 1058465; Sgt. R. H. Jacobs, 745652; A/C.2 R. King, 702215; A/C.1 L. W. Maddocks, 641878; L.A/C. E. McK. McF. Milne, 1057943; L.A/C. J. Miskimmin, 643201; A/C.2 H. Moss, 1150049; A/C.2 R. L. Norgrove, 1189495; A/C.2 R. K. Pike, 778152; A/C.2 W. G. Redwood, 778081; A/C.2. H. Smith, 1068905; L.A/C. D. W. R. Stewart, 1053544; P/O. P. G. Thornton-Brown, 81639; Act. Sqn. Ldr. F. C. Walker, D.C.M., 77741; Sgt. C. W. Wilson, 580844.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. J. A. Casey, 611870; L.A/C. W. Casswell, 1100639; A/C.1 L. Collins, 932289; P/O. M. F. C. Halahan, 88463; A/C.2 R. E. Hill, 1299316; Sgt. F. L. Holyoake, 751825; A/C.2 H. Major, 1052363; L.A/C. J. A. Mitchell, 918127.

DIED ON ACTIVE SERVICE.—A/C.2 R. C. Beaumont, 912617; A/C.1 W. C. Bellows, 634910; A/C.2 M. Blue, 1340960; A/C.2 F. H. Bowcock, 1121219; L.A/C. C. E. Brighton, 639024; A/C.1 D. H. Brown, 844681; Act. Sqn. Ldr. F. J. Buckland, 79013; A/C.1 J. J. Burnett, 701776; Cpl. H. W. Burville, 568120; A/C.1 E. H. Davies, 1159725; Sgt. F. Evans, 745704; A/C.2 W. Gray, 930741; A/C.1 F. Green, 100597; A/C.2 L. G. Hardie, 1354368; A/C.2 H. Horsfield, 992826;

BATTLING BALLOONISTS : Men of the Balloon Barrage squadrons at bayonet drill.

SERVICE AVIATION (Continued)

L.A/C. A. R. C. Ives, 551704; F/O S. H. Joelson, M.C., 72685; A/C.2 A. Little, 1024612; A/C.2 R. F. Mercer, 1085349; A/C.2 E. D. H. Morgan, 1123734; L.A/C. A. Quarmby, 936508; A/C.2 C. H. Richards, 1001401; Sqn. Ldr. W. H. Scott-Badcock, 75559; Sgt. J. G. S. Simmons, 751421; Sgt. W. G. Smith, 564763; A/C.1 L. A. Stewart, 979953; L.A/C. R. Taylor, 1164088; Sgt. E. W. Tiptaft, 507750; Cpl. F. A. Townsend, 158905; A/C.2 J. Trainer, 574540; A/C.2 T. J. Varlow, 1311699; Act. F/O. C. V. Walters, 45188; A/C.1 W. R. Wardell, 1300932; L.A/C. R. H. Waters, 645635; A/C.2 T. Watson, 1069491; A/C.2 S. E. Weiner, 774762.

PREVIOUSLY REPORTED MISSING, NOW REPORTED SAFE.—Sgt. G. H. Easton, 751228; Sgt. E. Watson, 967923.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED PRISONER OF WAR.—Sgt. J. F. Adamson, 748343; Sgt. L. Williams, 745357.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—A/C.2 J. F. Doublard 918468; Sgt. A. O. Lewis, 566649; L.A/C. J. E. Robert, 251182.

PREVIOUSLY REPORTED PRISONER OF WAR, NOW REPORTED SAFE.—Sgt. R. W. Lonsdale, 755548.

Royal Australian Air Force

DIED ON ACTIVE SERVICE.—Sgt. G. C. Curle, Aus. 207732.

Royal Canadian Air Force

KILLED ON ACTIVE SERVICE.—P/O. I. H. Acland, J. 2827.

MISSING.—Sgt. T. H. Rose, R. 56350.

Royal New Zealand Air Force

KILLED ON ACTIVE SERVICE.—Sgt. J. W. Bolton, N.Z. 40912; Sgt. J. Haslop, N.Z. 401726.

MISSING.—Sgt. R. H. Alington, N.Z. 30135; Sgt. D. W. Gough, N.Z. 40764; Sgt. T. G. Webb, N.Z. 40670.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW REPORTED SAFE.—Major L. A. Wilmot.

London Gazette

Royal Air Force

Air Ministry, April 11, 1941.

General Duties Branch.

The follg. are granted commns. for durn. of hostilities as P/Os. on probn.:—Temp. W/O.: (Jan. 30) A. J. Hartley. Flt. Sgts.: (June 16, 1940, sen. Apr. 25, 1940) A. P. Culverwell (substd. for notifn. of July 16, 1940); (Mar. 19, sen. Nov. 27, 1940) R. R. McPherson, H. J. Craig; (Mar. 21) F. P. Burard; (Mar. 25) L. G. M. Rees. Sgts.: (Dec. 23, 1940) A. F. Wallace; (Mar. 6) E. Richardson; (Mar. 11) D. A. Briggs; (Mar. 25) E. E. Brown.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.: —(Jan. 17) R. C. Hall; (Feb. 21) A. C. Ozouf; (Mar. 7) E. S. Marrs, D.F.C.; (Apr. 1) F. M. Biddulph, J. J. Campbell, D.F.C., W. Carter, G. A. Claire, D. H. Davis, D.F.C., B. L. Duckenfield, E. H. Francis, W. G. Gardiner, D.F.C., C. S. Greenaway, W. L. Jones, D. I. Pike, W. G. Redding, E. N. M. Sparks, C. D. Stenner, D.F.C.; (Apr. 7) I. C. Kirk, J. L. Scott; (Apr. 11) J. W. P. Perkins.

P/O. R. L. Hanbury is confirmed in his appt., Apr. 1, and granted war substve. rank of F/O. (Feb. 11).

The follg. F/Os. are promoted to war substve. rank of Flt. Lt.:—(Jan. 6) C. O'Donoghue; (Jan. 10) B. D. Wigginton; (Jan. 18) D. R. Walker; (Feb. 23) M. D. Evans; (Mar. 25) G. H. F. Plinston.

The follg. P/Os. are promoted to war substve. rank of F/O.:—(Nov. 6, 1940) J. Rhind; (Dec. 27, 1940) K. Schadtler-Law; (Feb. 1) C. Cookson; (Feb. 10) P. W. Lovely; (Mar. 2) V. C. Symmonds, E. W. Wootten.

P/O. A. Clough is granted war substve. rank of F/O. (Feb. 11).

The follg. are transfd. to Technical Branch (Apr. 24, 1940):—Wing Cdrs.: J. D. S. Denholm, C. A. Hoy, A. M. N. David, D. W. R. Ryley. Sqn. Ldrs.: R. J. Bennett, J. G. Cardale, C. J. Giles, C. H. Mitchell, D. N. Kington-Blair-Oliphant, S. P. A. Patmore, C. M. Stewart, L. R. Stewart, W. A. Theed. Flt. Lts.: K. A. Merritt, J. G. Priest.

F/O. M. Coupland takes rank and precedence as if his appt. as F/O. bore date Aug. 14, 1940. Reduction to take effect from Sept. 12, 1940.

Group Capt. R. S. Maxwell, M.C., D.F.C., A.F.C., is placed on retired list (Apr. 1).

The commn. of P/O. on probn. J. E. Kennedy is terminated on cessation of duty (Apr. 4).

The notifn. of Nov. 19, 1940, concerning Flt. Sgt. A. P. Culverwell is cancelled.

Technical Branch.

The follg. are granted commns. for durn. of hostilities as F/Os. on probn.:—W/Os.: (Mar. 12) J. F. Brown; (Mar. 17, sen. Nov. 27, 1940) C. H. O'Leary. As P/Os. on probn.:—W/Os.: (Mar. 17, sen. Nov. 27, 1940) W. F. Clark, E. Mortimer; (sen. Dec. 2, 1940) W. H. H. Smith; (Mar. 20, sen. Dec. 2, 1940) A. F. Ward. Act. W/O.: (Mar. 21) C. A. Martin. As Act. P/Os. on probn.:—Sgt. (Mar. 21) G. J. Quincey. Cpl.: (Mar. 21) W. S. J. Grant.

The follg. promotions are made with effect from dates stated:—(Mar. 1) Wing Cdrs. to be Group Capts. (temp.): J. D. S. Denholm, C. A. Hoy, M.C. Sqn. Ldr. to be Wing Cdr. (temp.): D. N. Kington-Blair-Oliphant; (Sept. 1, 1940) Flt. Lt. to be Sqn. Ldr. (temp.): K. A. Merritt.

F/O. A. B. Collins is granted war substve. rank of Flt. Lt. (Feb. 15).

P/O. on probn. L. Welch is promoted to war substve. rank of F/O. on probn. (Feb. 1).

Administrative and Special Duties Branch.

The follg. are granted commns. for durn. of hostilities as F/Os. on probn.:—W/Os.: (Feb. 22) W. E. Nightingale; (Mar. 17) F. J. Crane; A. P. Whale. As P/Os. on probn.:—W/Os.: (Feb. 14, sen. Oct. 7, 1940) S. H. Phillips; (Mar. 21) G. W. Brisbane, E. I. Thompson. As Act. P/Os. on probn.:—Flt. Sgts.: (Mar. 21) J. Robinson, G. Mitchell. Sgt.: (Mar. 21) J. A. Lewis.

Act. P/O. on probn. E. Skinner is graded as P/O. on probn. (Jan. 31).

The follg. P/Os. on probn. are promoted to war substve. rank of F/Os. on probn. (Mar. 1):—F. W. H. Ainsworth, F. E. Dudley, D. R. Sexton.

P/O. on probn. F. R. Rance is transfd. to Technical Branch (Sept. 9, 1940).

Equipment Branch.

P/O. on probn. W. E. Little is promoted to war substve. rank of F/O. on probn. (Mar. 1).

Wing Cdr. T. S. James takes rank and precedence as if his appt. as Wing Cdr. bore date Mar. 11. Reduction to take effect from Mar. 11.

Princess Mary's Royal Air Force Nursing Service

The follg. Sisters resign their appts.:—(Mar. 18) Miss H. M. Ellis; (Mar. 31) Miss D. K. Pye.

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS.

General Duties Branch.

Sqn. Ldr. W. N. Cumming, D.F.C., is promoted to rank of Wing Cdr. (temp.) (Mar. 1).

The follg. F/Os. are promoted to war substve. rank of Flt. Lt. (Mar. 23):—G. H. Goodman, T. R. Nelson.

F/O. N. J. Nock is transfd. to Technical Branch (June 16, 1940).

Technical Branch.

F/O. H. Webb is promoted to war substve. rank of Flt. Lt. (Apr. 24, 1940).

Dental Branch.

The follg. F/Os. are promoted to war substve. rank of Flt. Lt. (Sept. 23, 1939):—J. W. Smith, L.D.S., D.D.S. (Substd. or notifns. of Sept. 13, 1940, and Mar. 7); F. V. Frank, L.D.S. (Substd. for notifn. of Sept. 13, 1940).

Chaplains Branch.

Rev. F. W. E. Wagner resigns his commn. (Mar. 30).

Royal Air Force Volunteer Reserve

General Duties Branch.

F/O. H. Baron (Southern Rhodesian Air Force) is granted a commn. for durn. of hostilities as P/O. on probn. (Nov. 1, 1940).

The follg. are granted commns. for durn. of hostilities as P/Os. on probn.:—(Mar. 14) R. Wallis. Flt. Sgt.: E. J. Hayes. Sgts.: (Sept. 21, 1940) R. L. Roberts-Brown; (Jan. 29) M. F. Steggles; (Mar. 12) W. H. Maguire; (Mar. 13, Sen. Dec. 23, 1940) D. W. Skillman, G. H. Wright; (Mar. 15) R. M. Berry, H. J. A. Dyer, R. M. Lewin, A. J. Green; (Mar. 16) H. V. King; (Mar. 17) G. W. Scott; (Mar. 18) G. G. Dove; (Mar. 19) R. A. Mitchell; (Mar. 20) L. C. Pipkin; (Mar. 21) R. N. Tapley. Ldg. Aircraftmen: (Jan. 12) R. Wharton, J. P. Geoghegan; (Jan. 25) C. S. Cherry, D. C. Firth, R. A. Hobbs; (Jan. 29) R. A. P. Allsebrook, C. A. Barnes, P. Dixon, Spain, L. B. Ercolani, M. Foulis, M. R. Griffith, E. J. D. Guild, I. A. Lees, H. E. Maudslay, L. G. St. C. Pringle, T. E. Salazar, D. N. Sampson, T. Walton, I. W. Watson, D. S. S. Wilkerson; (Feb. 1) A. W. Ryan; (Feb. 9) G. E. Hastings; (Feb. 12) G. C. S. Macnamara, H. R. Noble, A. Palmer, Tomkinson, J. K. Russell, H. D. Seal, R. Wheldon, P. A. Woodger, J. McAnally, L. B. O'Reilly, I. W. Parfitt, L. S. Bradburn, J. T. Leacock, M. H. Hardstaff, C. M. Hone; (Feb. 23) E. G. Aires, R. F. Bennett, P. R. G. Howes, V. E. G. Phillips, W. A. Staniland; (Mar. 5) E. R. Roberton, G. H. King, A. N. Prior; (Mar. 6) A. Carus, K. M. Tuckfield; (Mar. 7) E. R. Ridyard; (Mar. 9) A. E. Ayris, D. H. Crouchen, A. C. Griffin, P. G. Oakes, R. H. Orton, P. W. Smith, J. T. Anderton, P. B. Ashby, C. F. Butler, H. R. Ellis, T. Franks, D. C. Furse, J. B. Gower, I. McA. Huntley-Wood, G. B. C. Key, P. A. Lovegrove, D. G. Macdougall, A. W. Mackay, L. F. C. Masi, P. F. Middleton, N. S. Milnes, J. F. Minett, J. H. Murray, P. W. W. Nock, J. B. O'Brien, F. D. Procter, J. Sanderson, M. H. Sherley-Price, M. J. M. Slater, M. A. Sproule, J. G. Symons, F. G. Tiller, M. T. K. Walkden, W. T. de B. Waters, C. R. Wright, R. G. M. Wright, G. L. Pinney, J. R. Holloway; (Mar. 14) P. F. Smith; (Mar. 15) R. A. Thomas.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.:—(Jan. 14) C. Whitton; (Feb. 6) V. Kramer, D.F.C.; (Apr. 1) V. W. Berg, R. D. Jamieson; (Apr. 1, Sen. May 13, 1940) A. T. B. Hutchinson, E. E. Spence; (Apr. 1, Sen. Oct. 11, 1940) S. E. Flett, P. Holdengarde; M. A. Johnson, D.F.C., E. P. Kleynhans, L. R. Olver, B. D. White, (Apr. 1, Sen. Oct. 26, 1940) C. P. Chilvers, R. S. Hales; (Apr. 1, Sen. Nov. 14, 1940) J. Walmsley; (Apr. 11) E. W. S. Jacklin; (Apr. 8) R. J. B. Pearse.

The follg. Act. P/Os. on probn. are graded as P/Os. on probn.:—(Dec. 11, 1940) E. F. Waters; (Jan. 20) J. C. D. Squibb; (Mar. 15) C. J. T. Gardner.

The follg. F/Os. are promoted to war substve. rank of Flt. Lt.:—(Jan. 6) K. M. G. Anderson; (Feb. 16) J. C. Carver; (Mar. 27) I. M. D. Little; (Apr. 9) A. J. C. Simpson.

P/O. N. R. Dobree is granted war substve. rank of F/O. (Feb. 6, 1940).

F/O. H. P. Aiken takes rank and precedence as if his appt. as F/O. bore date Feb. 27. Reduction to take effect from Feb. 27.

The notifn. of Jan. 3 concerning P/Os. G. A. Smith and E. T. Smith is cancelled.

The notifn. of Feb. 14 concerning L.A/C. I. A. Morris is cancelled.

The notifn. of Aug. 27, 1940, concerning the follg. is cancelled:—F. Albon, C. T. Campbell, J. H. Cloete, W. McG. Cooper, G. D. Cox, R. J. Mackie, S. H. Miller, P. A. Newton, J. A. S. Parker, J. Pringle-Wood, P. H. S. Simmonds, L. G. Stewart, J. Stidolph, J. R. D. Strang, W. Treger, A. Wilson, L. K. S. Wilson.

Erratum.

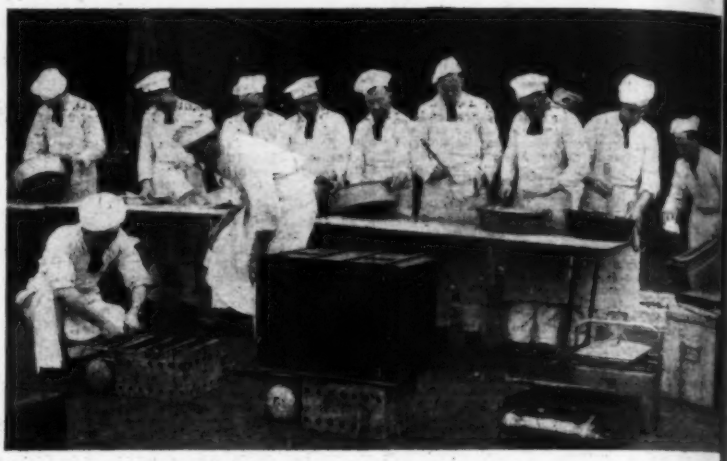
The notifn. of Mar. 21 concerning Flt. Sgt. R. C. Webster should have appeared under heading "Technical Branch" and not "General Duties Branch."

Technical Branch.

P/O. B. C. Wainer (Southern Rhodesian Air Force) is granted a commn. for duration of hostilities as P/O. on probn. (Oct. 1, 1940).

The follg. are granted commns. for duration of hostilities as P/Os. on probn.:—Sgts.: (Mar. 13, Sen. Dec. 2, 1940) L. L. R. Burch; (Mar. 15) J. H. I. Stirling. As Act. P/Os. on probn.: (Dec. 1, 1940) R. E. Whyard; (Feb. 28) J. I. Cox; (Mar. 12) W. T. Brown; (Mar. 14) F. C. Lowe.

The follg. P/Os. on probn. are confirmed



COOKERY NOOK: Students at the R.A.F. School of Cookery.

SERVICE AVIATION (Continued)

their appts. and promoted to war substve. rank of F/O.:—(Jan. 4) B. H. Hardy; (Jan. 17) J. H. Dixon; (Feb. 3) F. T. Harris; (Feb. 8) J. S. Healy; (Feb. 9) J. B. Flynn; (Feb. 15) L. Cook.

P/O. E. V. Sexton is granted war substve. rank of Flt. Lt. (Dec. 12, 1940).

The follg. P/Os. are granted war substve. rank of F/O.:—(June 25, 1940) G. G. Livesey; (Feb. 1) A. T. Woodmass; (Feb. 18) E. D. Whiting.

Balloon Branch.

The follg. are granted comms. for the duration of hostilities as P/Os. on probn.:—Sgt.: (Mar. 16) B. Faragher. Cpl.: (Mar. 17) A. W. B. Jackson. L.A/C. (Feb. 26) J. H. Horne. A/C 2: (Mar. 17) G. P. Eves.

Act. P/O. on probn. A. C. Meredith is graded as P/O. on probn. (Feb. 18).

The follg. P/Os. are granted war substve. rank of F/O. (Feb. 13):—L. H. Darby, G. Kellett.

Administrative and Special Duties Branch.

The follg. Southern Rhodesian Air Force officers are granted comms. for durn. of hostilities as P/Os. on probn.:—(May 1, 1940) P/O A. M. Bensusan; (Sept. 16, 1940) P/O. A. J. Mackenzie; (Oct. 3, 1940) P/O E. Plimley; (Oct. 14, 1940) P/O. W. T. Breech, A.F.C.; (Nov. 12, 1940) P/O. G. M. D. Burnett.

J. L. Dale is granted a comm. for durn. of hostilities as P/O. on probn (July 4, 1940, since terminated).

The follg. are granted comms. for durn. of hostilities as P/Os. on probn.:—(Nov. 9, 1940) F. D. S. Fitzmaurice; (Feb. 17) L. Griffith; (Mar. 7) L. M. Apps, C. Berkerleg, G. E. Cutts, V. F. Gillett, P. S. Hallas, R. Wilson-Hodgkinson; (Mar. 14) S. G. H. Ayscough, T. J. W. Bather, G. V. Bayley, C. Billington, L. G. Boore, H. L. Carr, A. C. Christison, T. A. Davis, L. G. Derrick, A. E. Dickinson, J. A. Driver, J. H. M. Dulley, F. Edwards, H. J. Forbes, H. C. Glen, G. J. Gorrie, G. A. Hinchliffe, D. P. Hurrell, P. James, J. Knape, G. H. A. Lane, A. R. A. Lee, C. H. Lee, F. H. Ludford, J. W. Norman, C. H. Reynolds, S. H. O. Rich, F. C. Smith, A. M. Snow, V. Sutton, R. Thomas, H. E. Weatherall, J. K. West, A. R. White; (Mar. 15) A. G. Jenkins, P. R. Mallinson, E. Masters, F. A. Mayatt, H. I. Steven, J. S. Ward, B. F. Wilmer; (Mar. 19) R. K. Emerson; (Mar. 22) H. S. L. Payne, H. C. Room, F. J. Wilcock; (Mar. 24) R. Abbott, L. J. Balman, H. W. Barrett, S. G. Harries, G. W. Harwood, G. Jenkins, D. G. Parson, L. H. Woollett. Sgt.: (Feb. 17) E. K. P. Ince. L.A/C.: (Sept. 14, 1940, rep. Aug. 27, 1940) J. H. Bastable. As Act. P/Os. on probn.:—Flt. Sgts.: (Mar. 21) R. Ollerhead, J. McCreesh, F. G. Baker, F. J. Spokes, W. J. Carr. Sgts.: J. Hopkins, L. R. Horrox, A. G. Hass, M. G. W. K. Harris. Cpls.: (Mar. 14) A. J. B. Vidler, R. Cobb; (Mar. 21) A. P. McIntosh, R. Steele, T. R. Jones, H. F. T. Martin, D. Aber, M. V. Coad, C. E. Cruft, T. H. Raw, J. H. C. Ward, F. L. Ghisi, N. A. Mason, T. G. Forster. L.A/C.: (Feb. 28) J. A. Crawford; (Mar. 14) H. A. F. Summers; (Mar. 21) G. H. Dingle, R. D. Butcher, C. A. Whitmore, E. P. Appleton, A. N. Barrowcliffe, F. N. Penn. A/C.1: (Mar. 7) A. J. W. Greenwood; (Mar. 15) H. Bramsdon; (Mar. 21) P. H. Smith, H. E. Collingwood, K. W. Ashberry, C. R. S. Beale, L. L. Schofield, T. L. Dodd; (Mar. 22) S. Vaughan, H. Woodhouse. A/C 2: (Mar. 14) A. S. Wordsworth; (Mar. 21) F. T. Rainey, E. S. Sharp, J. P. Swanson, D. L. Sherborne, H. J. Fradley, A. L. Spiller, J. O. Colmer, R. J. Hawker, W. J. Jarvis, A. C. Beever, N. Clayton, W. K. Jones, B. H. Cudmore, B. B. Joseph, S. E. Barber, F. H. Whitaker.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.:—(Jan. 9) J. M. Barwick; (Jan. 9) J. Macdonald; (Jan. 16) A. T. Gregory; (Jan. 17) J. E. Dunning; (Feb. 7) Rt. Hon. Lord G. Wellesley, M.C.; (Feb. 16) G. E. Browne; (Feb. 19) G. W. Parker; (Mar. 5) N. G. Durham; (Mar. 15) W. A. J. Gribble, H. M. Perzani, F. A. Ledgard; (Mar. 18) W. P. Wilson; (Mar. 20) D. S. Gales; (Mar. 21) D. Maskell; (Mar. 26) E. H. Dinsley, L. W. Waddell; (Mar. 31) F. W. Jelpke.

The follg. Act. P/Os. on probn. are graded as P/Os. on probn.:—(Dec. 27, 1940) R. P. Channell; (Jan. 3) F. R. Woodcock; (Jan. 10) B. A. Cosgrove; (Jan. 31) D. F. Woods; (Feb. 13) P. Grant; (Feb. 16) B. N. Evans Q. Garden; (Feb. 20) G. Le B. Kidd.

The follg. P/Os. are granted war substve. rank of Flt. Lt.:—(Feb. 8, 1940) A. H. Keenan, D.S.O., O.B.E., M.C.; (July 22, 1940) J. A. Norris; (Aug. 5, 1940) F. H. Bickerton.

The follg. P/Os. are granted war substve. rank of F/O.:—(Apr. 24, 1940) C. W. Wrightson; (July 31, 1940) G. W. Hodgkinson, M.C.; (Oct. 31, 1940) H. G. Keene; (Feb 2) R. H. Pilcher; (Feb. 12) N. Blond.

The follg. are transfd. to General Duties Branch:—F/O.: (Mar. 7) J. B. R. Brooke. P/Os. on probn.: (Nov. 1, 1940) H. S. Wynne-Edwards; (Dec. 9, 1940) H. V. C. Webb.

The follg. are transfd. to Technical Branch:—F/Os.: (Apr. 24, 1940) P. H. Dortè. F/Os. on probn.: (Oct. 2, 1940) E. C. Smith; (Oct. 4, 1940) R. V. Watts. P/Os.: (Apr. 24, 1940) G. N. Blundell, B. Drewe. P/Os. on probn.: (July 3, 1940) P. C. Jones; (Oct. 4, 1940) A. Scougall; (Oct. 26, 1940) J. F. K. Barton; (Nov. 15, 1940) J. E. P. Walshaw; (Nov. 24, 1940) A. F. F. West; (Nov. 25, 1940) F. Haile, A. S. Howgrave-Graham; (Dec. 2, 1940) E. H. Bland; (Dec. 7, 1940) G. R. S. Charles, F. C. Clarke, C. S. Henson, W. K. Walker; (Dec. 16, 1940) H. E. Langley, I. F. Newman; (Jan. 1) G. E. R. Burroughs; (Jan. 9) K. M. Dunsford; (Jan. 18) R. V. Brown; (Feb. 2) F. C. Bossard, G. P. Kendall, J. Symonds, A. R. Taylor, P. H. Taylor; (Feb. 10) D. B. Drage, S. Fletcher, R. G. Fall, W. R. Garnett, A. Smith, F. J. G. Stockwell; (Feb 17) N. A. Burges, D. M. Farquharson, A. L. Fussell, R. J. Lewis, F. R. McQuown, C. W. K. Mundle, W. M. Peel, G. D. Pilkington, A. McC. Pollock, E. D. Smith, R. E. Smith, E. H. Swain, W. M. S. Watters, M. P. Whitmore; (Mar. 11) W. Lyall; (Mar. 17) D. W. Robinson.

P/O. on probn. N. N. Matthews is transfd. to Accountant Branch (Mar. 15).

The follg. relinquish their comms. on account of ill-health:—F/O.: (Apr. 3) F. C. Staines. P/Os. on probn.: (Apr. 4) E. Milon; (Apr. 5) P. D. Wilson.

The follg. resign their comms.:—Flt. Lts.: (Mar. 31) J. A. Hone; (Apr. 7) W. M. Worman. F/Os.: (Feb 26) P. Edgar; (Mar. 30) Sir L. Twiston-Davies. P/O on probn.: C. Wade.

Training Branch.

The follg. are granted comms. for duration of hostilities as Act. P/Os. on probn.:—(Feb. 1) T. I. Alcock, C. H. Barling, E. Bradley, C. A. Brook, G. F. P. Brown, C. L. Burke, W. J. Buttle, L. Clarke, A.F.C., W. R. Cowles, D. J. Cutler, C. A. Dadswell, H. A. Davies, L. Dobbs, S. C. Elgar, W. E. Ellis, H. W. Gibbons, R. J. B. Greenwood, L. W. Hagell, H. Hercock, C. A. Hunter, F. W. Hunter, H. C. Jepson, A. Jones, J. H. Kickerty, D. E. Knott, J. H. Latchford, P. Lawson, F. J. B. Lovell, M. J. Paton, R. C. Poole, W. N. Price, C. P. Rawson, A. C. Robinson, H. J. Rose, H. G. Russell, R. I. Smith, A. W. Stacey, J. Sweetman, J. E. Taylor, W. W. Tebbutt, J. Townend, W. R. Trounson, H. N. Wade, A. H. Waite, F. K. Walter, C. F. Weaver, A. V. West, F. G. S. Wood; (Feb. 27) J. R. Cottrill; (Mar. 4) W. Stenhouse; (Mar. 7) S. Dumbell; (Mar. 8) A. W. Bursnall, W. E. Knight; (Mar 13) S. E. Sands; (Mar. 14) E. M. Williams; (Mar. 14) W. Baker, G. L. Bennett, H. H. Bentley, A. C. Bradbury, C. Catterson, S. Cooper, G. F. Cruickshank, C. Dain, M. H. Edmunds, G. H. Heath, L. Inkster, M.C., J. L. Jones, R. L. Leaning, V. T. Madden, D. McDonald, H. Mitchell, A. H. Preston, E. C. Raynes, J. C. Young; (Mar. 18) H. F. Halliwell, E. D. Hodge, I. G. Jenkins, C. G. Radford, B. G. J. Wood; (Mar. 19) V. J. Stirrup; (Mar. 20) P. H. Robinson, M.C.; (Mar. 21) F. Addison, W. G. E. Duke, J. Y. Eadie, A. Gibson, A. Henderson, M.C., H. J. Lane, F. Makin, A. Midgley, A. Smith, A. F. A. Todd, J. E. S. Turner, (Mar. 22) H. G. S. M. Chesterman, J. R. Cudemore, E. J. Hodge, C. M. Hyslop, S. Jones, E. W. Moore, J. G. Sutherland, A. F. Turton, L. G. Vedy; (Mar. 23) A. F. Forsyth, A. E. Hodges, T. J. Hunt, L. T. Legge, R. J. Lloyd, E. H. Mander, S. C. Nunn, E. L. Parry, J. W. Pirie, T. I. Powell, M. W. Thomas; (Mar. 24) G. F. Allan, R. S. Anderton, R. W. Arnold, N. Boucher, K. Budleigh, S. V. Carter, J. B. Frizell, A. W. Goodfellow, G. A. W. Hall, A. R. Ingles, A. J. W. Jeffery, J. C. K. Miller, J. M. Nicol, F. Pescod, J. V. Rushton, E. A. Tester, G. E. Thomas; (Mar. 25) V. R. Hadkins, W. J. Hall, J. H. C. Horner, I. Jones, W. A. W. Launder, H. Lister, F. R. Price, J. H. Wharmby, A. B. Wignall, K. G. Wiles, E. S. Wood.

Equipment Branch.

P/O. on probn. I. F. McNicoll is confirmed in his appt. (Nov. 21, 1940) and promoted to war substve. rank of F/O. (Feb. 2).

The follg. Act. P/Os. on probn. are graded as P/Os. on probn.:—(Nov. 25, 1940) T. W. Pearson; (Dec. 18, 1940) J. A. Nisbet; (Jan. 31) J. C. Johnson; (Feb. 17) N. D. Hart; (Feb. 22) E. Graham; (Mar. 7) C. E. B. Baker, W. T. Barnard, N. J. Donaldson, W. Dowell, D. F. Grant, G. G. Hann, C. D. B. Hawksley, A. T. Hillery, H. L. Hulme, A. R. Jeffery, P. W. Joyce, W. A. Leach-Lewis, F. D. Lynch, D. S. McNeil, B. J. O'Reilly, D. A. Porter, K. A. W. Slater, A. McF. M. Stevenson, C. Taite, M. S. Waghorn, W. R. Collingwood, H. Favish; (Mar. 10) D. C. Munro.

The follg. P/Os. are granted war substve. rank of F/O.:—(Feb. 23, 1940) W. E. Hole; (Nov. 12, 1940) F. L. Edgerton.

P/O. on probn. C. A. Edgell is transfd. to Administrative and Special Duties Branch (Feb. 28).

Accountant Branch.

P/O. on probn. A. W. Hardie is confirmed in his appt (Nov. 23, 1940) and promoted to war substve. rank of F/O. (Jan. 22).

The follg. Act. P/Os. on probn. are graded as P/Os. on probn. (Mar. 7):—J. H. L. Dougan, C. Kellehar, B. H. Gallatley, G. R. Goude.

Medical Branch.

The follg. are granted comms. for duration of hostilities (Mar. 11) as Flt. Lts.:—B. J. Bickford, M.B., B.S., F.R.C.S., L.R.C.P.; M. O. J. Gibson, M.B., B.Chir., M.R.C.P., M.R.C.S. As F/Os.:—J. S. H. Scott, M.R.C.S., L.R.C.P.; F. A. Thompson, M.R.C.S., L.R.C.P.; E. R. T. Crabb, M.R.C.S., L.R.C.P.; S. E. White, M.R.C.S., L.R.C.P.; T. J. Conran, M.B., B.Ch.; S. Goode, M.R.C.S., L.R.C.P.; M. Crowley, M.B., B.Ch.; A. A. Macgibbon, M.B., Ch.B.; E. J. G. Murray, M.B., B.Ch.; J. B. Good, L.M.S.S.A.; R. H. Francis, M.R.C.S., L.R.C.P.; E. G. Fox, M.B., B.Ch.; J. Guthrie, M.B., Ch.B.; T. H. Redfern, M.B., Ch.B., M.R.C.S., L.R.C.P.; C. M. Dickins, M.B., B.Chir., M.R.C.S., L.R.C.P.; T. L. Barbour, M.B., B.Chir., M.R.S.C., L.R.C.P.; F. J. R. Stoneham, M.R.C.S., L.R.C.P.; P. E. Percival, M.B., B.Chir., M.R.C.S., L.R.C.P.

The follg. are granted hon. comms. as Flt. Lts. (Sept. 23, 1940):—J. G. Lynch, M.D., C.M.; R. J. Sims, M.R.C.S.; J. Tolson-Smith, M.D., C.M.

The follg. F/Os. are promoted to war substve. rank of Flt. Lt.:—(Feb. 13) S. C. Williams, M.B., B.S.; (Feb. 20) N. McSharry, M.B., Ch.B.; (Mar. 5) J. Walsh, M.B., B.Ch., D.P.M.

Dental Branch.

The follg. are granted comms. for duration of hostilities as F/Os.:—(Feb. 28) D. H. Drummond, L.D.S.; (Mar. 11) J. Kitchen, B.D.S.

Auxiliary Air Force

General Duties Branch.

Act. P/O. on probn. H. S. Thomas is confirmed in his appt. and graded as P/O (Jan. 11, 1940) (substd. for notifns. of June 4, 1940, and Feb. 14).

Administrative and Special Duties Branch.

P/O. H. C. W. Miles is promoted to war substve. rank of F/O. (Nov. 12, 1940).

F/O. G. R. A. Wilson is transfd. to Technical Branch (Apr. 24, 1940).

Auxiliary Air Force Reserve of Officers

General Duties Branch.

F/O. A. P. Gray is granted war substve. rank of Flt. Lt. (Feb. 16).

Women's Auxiliary Air Force

The follg. are appointed Assist. S/Os.:—(Mar. 28) Cpl. L. M. Angell, Cpl. F. H. Ballard, Cpl. K. M. Boyle, Cpl. A. Cantrill, Cpl. C. M. Chapman, Sgt. S. L. Cochrane, Cpl. D. S. R. Cox, A/CW.2 L. H. Dakin, Cpl. C. M. P. Hawtin, A/CW.2 H. R. Hunter, Cpl. D. L. McCubbin, A/CW.1 B. M. Mill, Cpl. M. C. Russell, Cpl. J. H. Rylands, Cpl. C. M. Warner, Cpl. P. M. Wright, Cpl. N. M. de L. Young; (Mar. 29) A/CW.1 J. M. Arnott, A/CW.1 K. M. Bailey, Cpl. C. L. Day, A/CW.2 G. D. J. Gainsford, A/CW.2 H. L. Gardiner, A/CW.2 M. I. Mason.

The follg. Assist. S/Os. relinquish their appts.:—(Mar. 13) M. H. Hawthorn; (Mar. 16) L. M. Teal; (Mar. 25) D. Betbeder; (Apr. 1) B. C. Cripps; (Apr. 8) M. H. Forbes.

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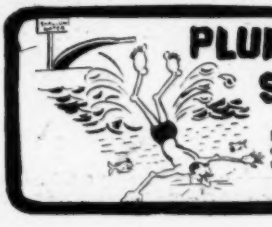

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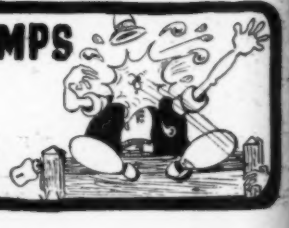

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